AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

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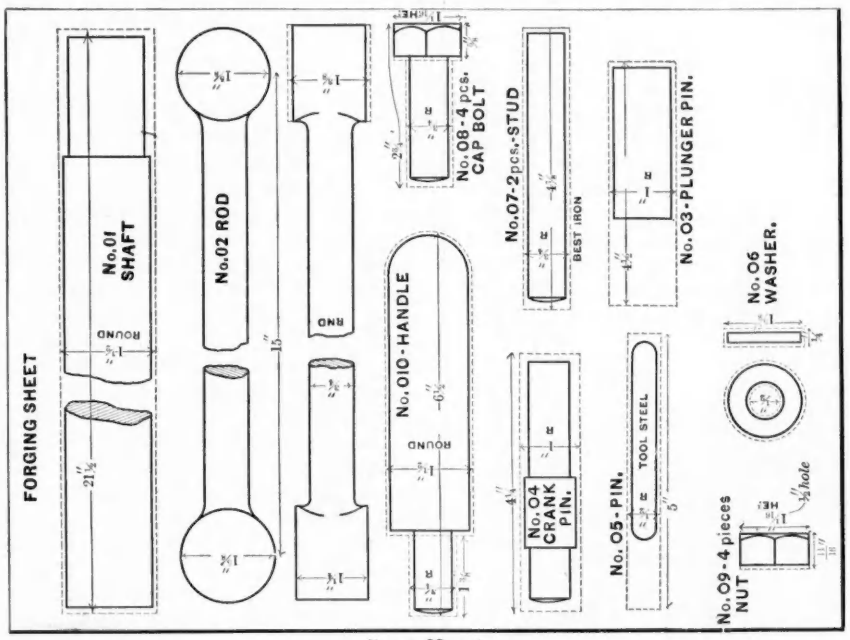

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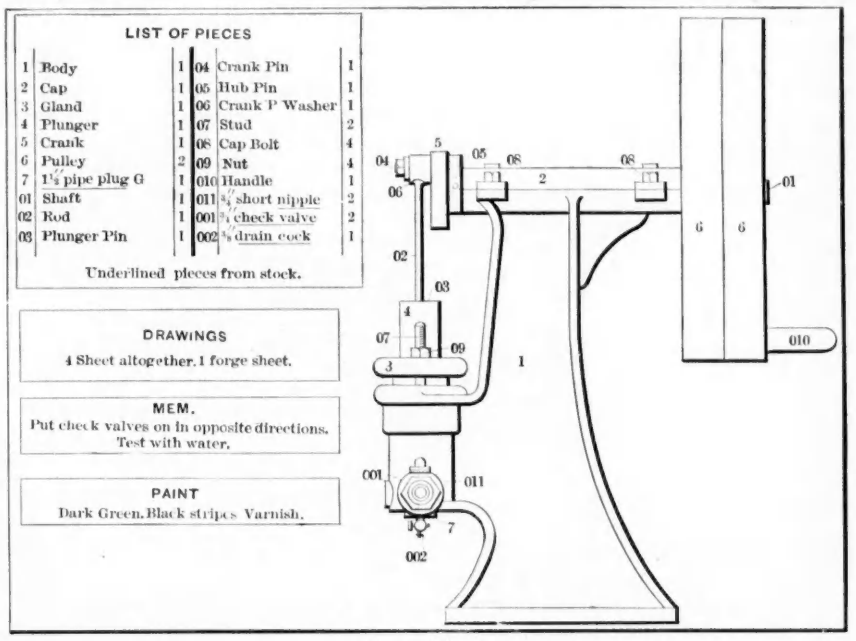

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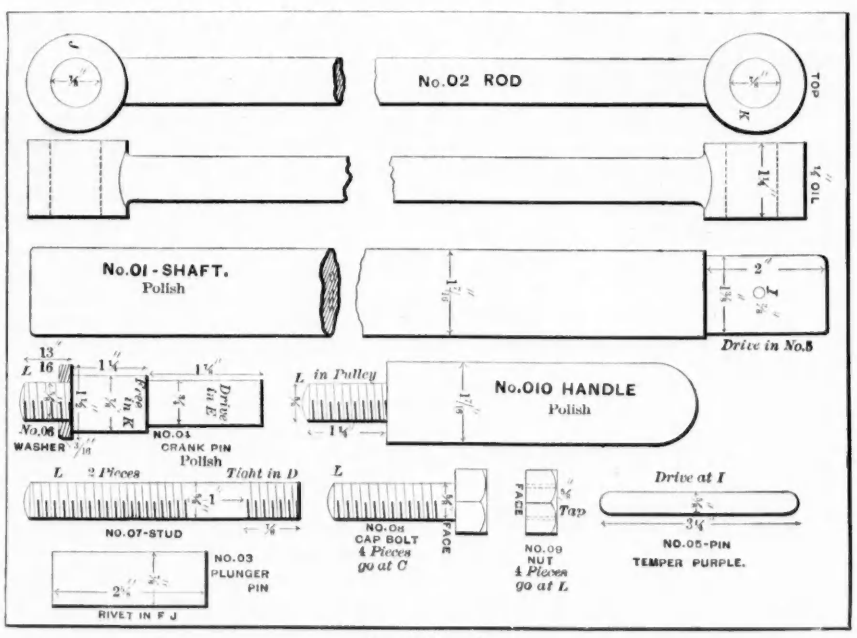

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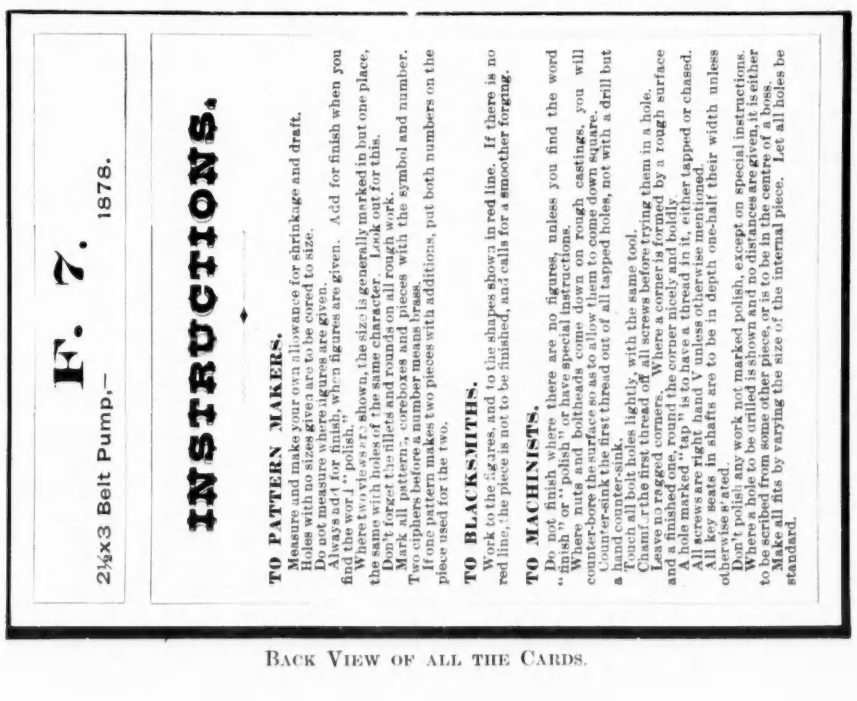
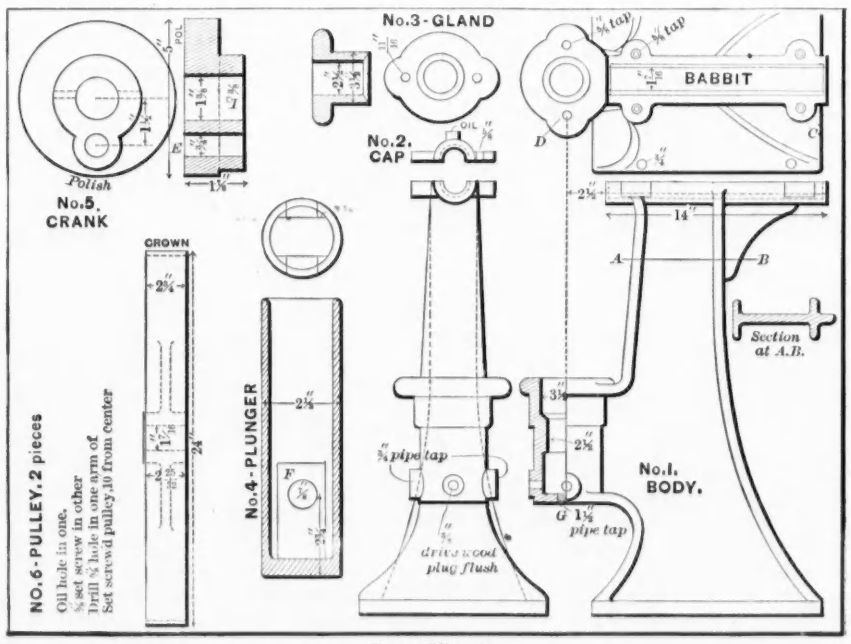

F. 7.
2½x3 Belt Pump,—
1878.
INSTRUCTIONS.
TO PATTERN MAKERS.
Measure and make your own allowance for shrinkage and draft.
Holes with no sizes given are to be cored to size.
Do not measure where figures are given.
Always add for finish, when figures are given. Add for finish when you find the word "polish."
Where two pieces are shown, the size is generally marked in but one place, the same with holes of the same character. Look out for this.
Don't forget the fillets and rounds on all rough work.
Mark all patterns, number and pieces with the symbol and number.
Two or more patterns, number and pieces with the symbol and number.
If one pattern makes two pieces with additions, put both numbers on the piece used for the two.
TO BLACKSMITHS.
Work to the figures, and to the shapes shown in red line. If there is no red line, the piece is not to be finished, and calls for a smoother forging.
TO MACHINISTS.
Do not finish where there are no figures, unless you find the word "finish" or "polish" or have special instructions.
Where nuts and boltheads come down on rough castings, you will counter-bore the surface so as to allow them to come down square.
Counter-sink the first thread out of all tapped holes, not with a drill but a hand counter-sink.
Touch all bolt holes lightly, with the same tool.
Chamfer the first thread off all screws before trying them in a hole.
Leave no ragged corners. Where a corner is formed by a rough surface and a finished one, round the corner nicely and boldly.
A hole marked "tap" is to have a thread in it, either tapped or chased.
All screws are right hand V unless otherwise mentioned.
All key seats in shafts are to be ¼ depth one-half their width unless otherwise specified.
Don't polish any work not marked polish, except on special instructions.
Where a hole to be drilled is shown and no distances are given, it is either to be scribed from some other piece, or is to be in the centre of the piece.
Make all fits by varying the size of the internal piece. Let all holes be standard.

BACK VIEW OF ALL THE CARDS.



CARD NO. 3.

SACKETT'S SYSTEMS OF WORKING DRAWINGS.

[These illustrations are one-third size, the drawings being made on mounted tar-board, ten by thirteen and one-half inches. Back label is pasted on. Three coats of white shellac varnish all over back and front. One coat of varnish is put on drawing before any figuring is done, in order that corrections may be made easily.—See page 2.]

Extracts from Chordal's Letters.

SACKETT'S DRAWING SYSTEM—HIS METHOD OF GETTING OUT ONE F. 7.

Mr. Editor:

* * * * I have at various times mentioned Sackett's drawings, or system of drawings, rather. From what I have seen of shop drawings, I have concluded that Sackett has reduced the thing to more of an economical system than any one else, and I therefore feel justified in giving you a pretty full account of the matter. I got from Sackett's shop a complete set of drawings of a little twenty-five dollar belt pump. I chose this set because there was but little of it, and it could easily be illustrated in your pages. Please bear in mind that this is not sent you as an exhibition of pumps, or even of drawings, but as an illustration of a system of work for the draughting room. These cuts which I send you you must not look upon as drawings of Sackett's pump, but as pictures of Sackett's drawings. (See page 1.)

* * * * Before going into the matter of system, I will give the drawings what little description they need. The set, as I found it, comprised seven sheets of drawing, but in preparing copies for your pages, I crowded the work somewhat so as to make four sheets answer. The drawings are made on tarboard cards, having white paper mounted on them. The cards are ten by thirteen inches, which is a standard paper maker's size. The cards are purchased ready for use from Wm. Mann, stationer, of Philadelphia.

Sackett only has this one size of drawing around his premises. The back label is pasted on in the drawing room, and the finished drawing has three coats of white shellac varnish, all over, back and front. One coat of varnish is put on the drawing before any lettering or figuring is done. A light sandpapering of the varnish gives a nice "tooth" to the surface. By this means, if a figure is to be corrected or altered, it need not be dug out of the paper, as it simply lies under the second coat of varnish. After the correction is made, dabs of varnish are laid over the spot. The cards cost about eight cents each. They are much more durable than wooden boards, are light and easy to handle, and can be stored easily. The drawing board adapted to the use of these cards, is an inch and a half thick; size, fourteen by seventeen inches. There is a recess to receive the card and leave the upper surface of the card flush with the margins of the board. The recess is an eighth of an inch, all round, larger than the card. Small wood screws, with one side of the head filed away, are sunk in the edges of the recess, and by a quarter revolution, serve to chuck the card. This simple screw rig is used after experience with numerous ingenious clamping devices.

* * * * This pump consists of twenty pieces. The drawings define all of the pieces, give the name of the piece, its designating number, show how they go together, tell how many drawings there are in the set, tell about the painting, give all finished sizes in figures, and all forging sizes in figures; tell, without wording, what material is used, etc.

Card No. 1 is the forging sheet. Each wrought piece is shown in very heavy lines, and if the shape of the forging is to differ from the shape of the finished piece, the shape of the forging is shown by red lines. As you can't print red lines, I have used fine dotted lines in the examples. Notice that pieces No. 03 and 05 are forged much longer than they finish. This is to give dog room. Notice that piece No. 04, while having some complication as a finished piece, is a plain piece in the rough.

Notice that there are no dotted lines on the working sheets where not absolutely needed. Notice that there are no counter lines, or any extra lines, in fact. Notice that the pulley, No. 6, is not detailed. The pattern maker makes hub patterns only to fit standard pulley patterns. Notice that all art is left off the drawings. Notice that two views are shown only when necessary. Notice that much of the figuring on one of the cards is wrong side up. This is a draughtsman's blunder.

* * * * The following conversation with Sackett will serve to illustrate his drawing system.

Chordal.—Do you like the cards?

Sackett.—Better than anything else. Have used paper drawings, tracings, paper mounted on wooden boards, drawings on wooden boards, and lots of things; everything, I guess; but I think these cards the best, and have no fault to find with them.

C.—Are they big enough for all work?

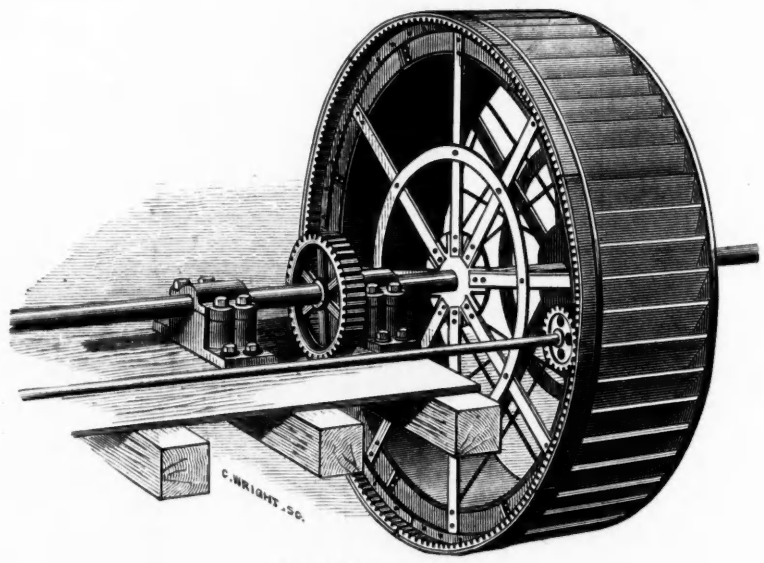
S.—Anything you can make in a machine shop you can record on those cards. I use them for marine engine work, for bridge work, boiler work, and everything. They are used for locomotive work by some. Never found them too small. Sometimes put different views of the same piece on separate cards.

C.—Aren't the views small for pattern maker?

S.—No. Pattern maker always makes a drawing of his pattern, which is an entirely different looking thing from the piece, showing core prints, core boxes, etc. Sometimes the draughtsman furnishes full size drawings for the pattern maker, when the piece is simple and uses no cores. Such drawings are charged to patterns. I never allow a draughtsman to draw a core box, or to dictate how a pattern is to be made.

C.—Do you draw everything on cards?

S.—No. Cards are my permanent shop drawings of my articles of manufacture, things which I make regularly and want good durable drawings for. For temporary work I use temporary drawings, which are got out of the way as quick as possible. For temporary work I use sheets of brown detail paper, same size as the cards, with same label printed on the back. When done with they are put in a big envelope and stored away.



IRON WATER WHEEL.

C.—Explain the process of getting out a new machine, so far as drawings are concerned.

S.—Well, I will take this little pump, for instance. Everything done in this shop is done on orders from the office. Here I find an order several years old, No. 34,763. It reads this way:

"To draughtsman:—Scheme out a small, cheap pump, with 2½-inch piston or plunger. Pump to run by belt, and have hand crank. To be sold on market at low price for general boiler feeding purposes. Estimate cost of drawing, patterns and of pumps made in lots of a dozen without special appliances. Submit design with time spent on same. No hurry."

This order went to my draughtsman. He returned the order with four hours marked on it. These 4 hours are charged to "designing." I may never have built the pump, so I call all such work preliminary. When he returned the order, he submitted his sketches and estimates. They are returned to him without orders. He puts them in an envelope endorsed "Pump—Order No. 34763" and files them away. That's all there is of it. The work ordered is done and charged up. A year afterward I find an order "No. 56809—To draughtsman:—Get out working drawings for the pumps designed on order 34763, quick as possible, and, upon receipt of same back from shops, make permanent drawings. Report cost of all of same on this order. Charge pattern shop with any special work."

On the strength of this, the draughtsman made paper drawings, same as temporary drawings. The drawings were just about like these you have. He made a big drawing of the body for the pattern maker's use; this in pencil. He called the machine F 7. F means a pump, whether it's a belt pump or a steam pump, or what not; and F 7 means the pump that is shown in F 7 drawings. All time, &c., on this thing is hereafter charged to F 7, and the patterns are so marked. We carry the machine on the books as F 7, mark its photographic negatives F 7, and have F 7 cut into the wood-cut of it. I will tell you more of symbolism hereafter. When the drawings were done, they went to the pattern shop with an order. When patterns were done, they were stored on a special shelf, marked F 7, and the order came back with time and material noted upon it for charge to patterns. Here is an order to foundry to get out castings for one F 7, with a list of the pieces. The order came back with the weights noted. The return of the order was a sign that the castings were done. Blacksmith shop got an order to get out forgings for one F 7, with a list of pieces. Order came back with weights and time noted. Here I find an order given the machine shops to fit up one F 7, with a list of all pieces and columns for different kinds of work. These orders are all on printed blanks, and instead of making work, as you might suppose, they save work.

The shop foreman never gets an order to fit up a thing until the stock has been ordered. You will notice that there are some pipe fittings, valves, etc., on this job. An order went to the store room to furnish machine foreman stock for one F 7. The order came back with a list with costs attached. When the pump was done, the foreman returned the order with the time on each piece noted. At the same time he returned the drawings with a correction blank. This correction blank calls attention to things generally, such as suggesting that gland hole be made a sixteenth larger, so as to be suited to some old boring bar, and mentioning that plunger will not easily finish to size, and that the cap don't match the body nicely. Draughtsman now makes permanent working drawings on cards with the correction sheet in view. When the drawings were done, he stuck them in a pigeon hole, marked "F 7," and sent the original order, on hand maybe a year, to the office, with time and drawing stock noted, and also a note of ninety cents for a special sheet made for pattern maker. He destroys the temporary drawings. The correction sheet goes to pattern maker with new drawings, and he doctors his patterns accordingly. Patterns are charged with all items noted on pattern maker's orders. Drawings are charged with notes on draughtsman's orders, and the ninety cents is charged to patterns and not to drawings. The draughtsman has all drawings not in use in the shop, and after being used they are returned to him. The machine foreman has them washed with soap and water before returning them. As soon as the draughtsman finished the permanent working drawings, he made copies of them on paper 10″ × 14½″. These copies are made as follows:

Sheets of common unruled letter paper are soaked in castor oil dissolved in absolute alcohol. When sheets are dry we have a heavy tracing paper. Drawings are then traced, and the tracings are soaked in absolute alcohol. This cuts out the oil and leaves the paper opaque again. These copies are on paper one inch longer than cards. They are bound in book form for use in the office. Here is the F 7 book. See what it contains. Here we have the drawings complete. Here is a complete specification. Here is a list of the separate pieces with weights, time, and cost filled out; here are proofs of all photographs and cuts made of the machine; here the note of capacities from actual test; here a list of sales made, with name of consignee, date of shipment, and price received; here a note of the cost of design of drawings, and of patterns; and here extracts from letters regarding the machine—complaints, commendations, uses to which they have been put, etc., etc. This book is our only source of information regarding F 7. We do the same with all machines, and this book is of immense value, especially with a peculiar machine just making its market. The book, as it comes from the draughtsman, is charged to drawings, and the headings for the sundry notings are made by the draughtsman. These are filled up in the office, of course.

I have taken time to describe this process, but you will see that not a single extra man is involved, and no extra work is done. The ordering, etc., is what must be done by somebody in every shop. I simply systematize the thing, and bring a record of all costs into the office by a return of the orders. I also free my men from work which don't belong to them. You will notice that my machine foreman didn't bother about the drawings, or the patterns, or the castings. He didn't do anything till he got an order. In too many shops the whole thing falls on the machine shop, and that means an overworked foreman or a hap-hazard job. I now build these pumps by the dozen, and some other time I will take you through the process of getting them out, keeping the time, fixing the price, etc., etc., though, in fact, a dozen are got out the same as the single one was, that is, by orders to different men, and by return of orders with data noted thereon. You may be interested, however, in knowing how the machine shop foreman gets the figures which he puts on his order.

* * * * When Mr. Sackett had done I asked for the loan of the drawings. He turned me over to the draughtsman with an order for the drawings. The draughtsman gave me the drawings, and put the order in the pigeon hole as a voucher.

* * * * Very respectfully,

CHORDAL.

New Iron Water Wheel.

The water wheel herewith illustrated, was designed by Ribon & March, Jersey City, N.J., for driving machinery in the sugar and coffee districts of South America.

It is made in small sections for convenience in transportation in localities where there are no railroads. One of these wheels, the diameter of which is 40 feet, is now being built by the concern previously mentioned. This wheel has a 5 ft. face and 128 buckets, which are supported by 32 arms, or 16 at each side.

The gear upon the side of this wheel, instead of being internal, as shown in the cut, is to be a spur gear with a pitch of 3½″, and gearing with a pinion of 24″ diameter. The shaft is 11″ in diameter, is coupled in the middle, and has an eccentric forged upon each end, so that, when it becomes necessary to repair the journals, a strip of iron is placed upon the sole plates under each of these eccentrics; then, by turning on a small quantity of water,

the wheel will rotate and the eccentrics lift the shaft clear of its bearings. This is a very ingenious arrangement. Each half of the shaft will weigh about 1,600 lbs.; the sole plates about 1,500 lbs., and the spider 1,800 lbs. each; half, of course, weighing 900 lbs. This wheel is expected to develop about 40 H.P. A small gear is applied to the shaft of these wheels, as shown, when desired for greater power and slow speeds.

It is said that a Worcester, Mass., man has invented an important improvement relating to telephone call bells, which does away with the ringing of all the bells on a circuit when only one station is called. It is described as being simple in detail, its application to existing lines, at a small expense, being perfectly feasible.

A correspondent writes us: Referring to a recent article on the "Grindstone," in your columns, if any one is desirous of turning one off, and will use, say a $\frac{3}{8}$ or $\frac{1}{2}$ inch pipe, continually turning it slightly in the hand, he will always thereafter discard other means.

In making a tap, when it is necessary to file a clearance in the threads, it will be found of advantage to heat it until it becomes blue, before filing; the difference between that color and the newly filled portions being an excellent guide in the filing. This will apply to reamers and many other tools.

Sugar Evaporating Apparatus.

The general process employed in making sugar from cane juice was described by us in the AMERICAN MACHINIST of Aug. 3, 1880, and does not require repetition at this time.

The disadvantages of the old methods employed for making sugar were described in detail, and since the advent of the vacuum pan rapid improvements have been made.

The apparatus shown in the accompanying engraving represents what is known as the American Rillieux apparatus. It was originally invented by N. Rillieux, of Paris, and is now made by the Pioneer Iron Works, South Brooklyn, N. Y.

The general principle upon which this apparatus works is well known. But there are improvements being introduced, which tend to make the apparatus more efficient. The apparatus here presented is said to be the largest ever built. It has 4,500 square feet of heating surface, and was built under a contract to produce 50 hogsheads of sugar every 18 hours.

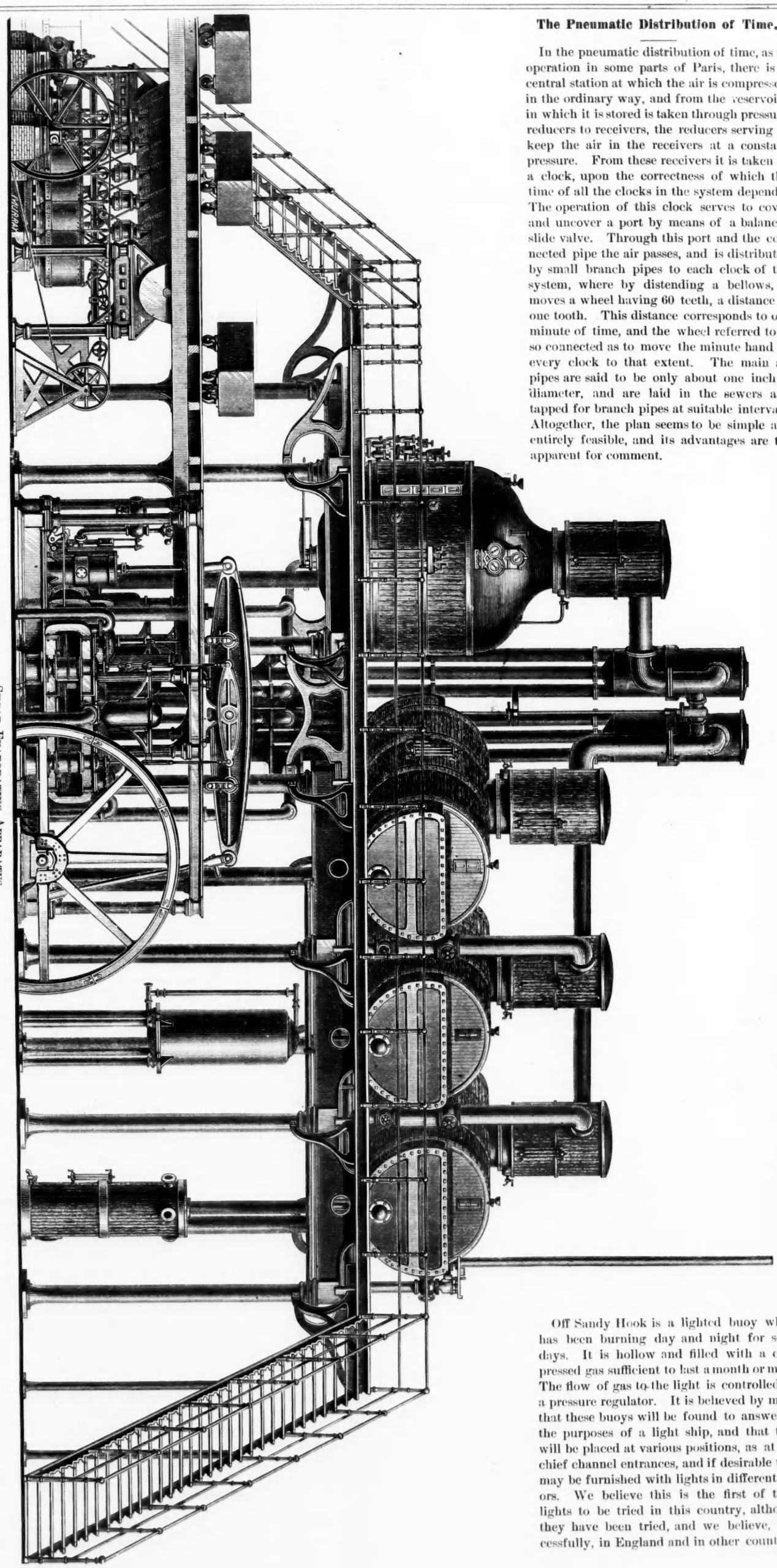
At the left of the engraving are six hanging centrifugal machines, driven by a small engine, as shown.

By the application of several recent improvements in the method of suspension, these machines are said to perform their work with dispatch, and in a manner entirely satisfactory. The pumping engine, which is the largest of its kind ever built for sugar apparatus, is of the beam type. The steam cylinder is 20″ × 48.″ Two large air pumps, 26″ × 24,″ are attached to the main beam, and connect direct with the apparatus.

There are eight small pumps attached to small beams placed upon the main beam center. Four of these pumps have cylinders 10″ × 16″ and two 14′ × 16.″

There are also two small pumps, one for juice and one for syrup. The cylinders of all the small pumps are made of brass, without lining, so that they may be bored out when required. It will be noticed that this apparatus is very compact, and is well calculated for handling the material for making sugar with the least possible expenditure of labor. Every sugar apparatus built at the works before alluded to, is set up before shipping, so that when it arrives at its destination, little or no extra work is required in erecting the same.

N. Rillieux, in an article in one of the French papers some months since, acknowledged that the Rillieux apparatus as made in America was far superior to that made in France, which was certainly a very frank acknowledgment on his part. The sugar-making apparatus is strongly supported on iron columns, and the parts have been arranged in as many pieces as possible, for convenience in transportation.



SUGAR EVAPORATING APPARATUS.

The Pneumatic Distribution of Time.

In the pneumatic distribution of time, as in operation in some parts of Paris, there is a central station at which the air is compressed in the ordinary way, and from the reservoirs in which it is stored is taken through pressure reducers to receivers, the reducers serving to keep the air in the receivers at a constant pressure. From these receivers it is taken to a clock, upon the correctness of which the time of all the clocks in the system depends. The operation of this clock serves to cover and uncover a port by means of a balanced slide valve. Through this port and the connected pipe the air passes, and is distributed by small branch pipes to each clock of the system, where by distending a bellows, it moves a wheel having 60 teeth, a distance of one tooth. This distance corresponds to one minute of time, and the wheel referred to is so connected as to move the minute hand of every clock to that extent. The main air pipes are said to be only about one inch in diameter, and are laid in the sewers and tapped for branch pipes at suitable intervals. Altogether, the plan seems to be simple and entirely feasible, and its advantages are too apparent for comment.

Off Sandy Hook is a lighted buoy which has been burning day and night for some days. It is hollow and filled with a compressed gas sufficient to last a month or more. The flow of gas to the light is controlled by a pressure regulator. It is believed by many that these buoys will be found to answer all the purposes of a light ship, and that they will be placed at various positions, as at the chief channel entrances, and if desirable they may be furnished with lights in different colors. We believe this is the first of these lights to be tried in this country, although they have been tried, and we believe, successfully, in England and in other countries.

Nomenclature of Machine Details.

BY OBERLIN SMITH.

A PAPER READ BEFORE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

That the nomenclature of machinery, and of the tools and apparatus with which it is constructed, is, in this country, in a state of considerable confusion, scarcely needs demonstrating. If we look from an international point of view, and include the other English speaking countries, Great Britain and her colonies, the confusion becomes worse confounded. A reform is destined, in due time, to come, doubtless to be promoted in great degree by such societies as ours. This reform movement cannot be begun too soon, and should aim at giving brief and suggestive names to all objects dealt with—each object to have but one name, and each name to belong to but one object. A simple method of beginning such a reform, would be a common agreement among all our engineering schools to use each technical word in but one sense, and with no synonyms.

A lesser field of reform, and one which lies more particularly within the jurisdiction of individual manufacturers, is the comparative designation of a number of sizes or kinds of the same machine. There is now no common understanding whether a series of sizes shall be numbered or lettered from the largest down, or from the smallest up. The latter is undoubtedly the most natural and suggestive method, but usually becomes confused by want of careful forethought (when starting a series) in providing "gaps" for the insertion of future sizes. If a numerical series has been already started, and become commercially established, the only systematic way to insert new sizes (either at the beginning or through the middle of the series) is to use fractional numbers. This, though awkward in sound and appearance, seems to be the only means of suggesting the comparative size of the article by its name. The use of arbitrary higher numbers between the others is, of course, worse than no numbers at all. The use of a series of letters does not supply this fractional loop-hole of escape—the euphony of A-and-a-half, K-and-three-quarters, etc., being somewhat doubtful. Another method in much favor is the use of "fancy" names, such as "diminutive giant," "eureka, "firefly," etc. These are far preferable to confused numbers, as they are not intended to convey any ideas between manufacturer and customer, and admirably succeed in their purpose. All this is a very difficult subject to deal with, and one in regard to which we can scarcely hope for any exact system. We can but point out to manufacturers two general principles to be followed: 1st., of leaving abundant *gaps*—that is, let a regular series run 10, 20, 30, 40, etc., instead of 1, 2, 3, 4, etc.; and, 2nd: of using the smaller numbers for the smaller objects. The second is similar in idea to the numbering system of a well-known Philadelphia house, which has worked so admirably in practice, and which has been copied by numerous other cities.

The two foregoing paragraphs are intended respectively as but casual allusions to the technical and commercial nomenclature of machinery in general. The subject is too elaborate to be treated at length in this paper, the main purpose of which is to set forth the results of the writer's experience in establishing a system of names and symbols for all the component parts, commonly called "details" of machines, or, in fact, of any manufactured articles.

That some such system is necessary, no engineer who has attempted to manufacture machinery by the modern system of duplicate (or approximately duplicate) parts, will, for a moment, question. The necessity for a specific name for each piece, which name is not, never has been, and never will be, used for any different piece of the same or any other machine, is evident, simply for purposes of identification. This identification is required mechanically at almost every stage of production. The name, or a symbol representing it, should be marked upon the drawings, the patterns, and the special tools pertaining to each piece, and, when convenient, upon the piece itself. Commercially, it is required on time cards and in indexes and pattern lists and cost books as pertaining to production. Pertaining to sales these names or symbols must appear in illustrated price lists, and in orders by and charges to customers. This, our modern method of repairs, by selling duplicate parts, renders imperatively necessary.

The requisites for a good system of names and symbols are : 1st, *isolation* of each from all others that did, do, or may exist in the same establishment. 2nd, *suggestiveness* of what machine, what part of it, and, if possible, the use of said part—conforming, of course, to established conventional names, as far as practicable. 3d, *brevity*, combined with simplicity. Of the importance of isolation to prevent mistakes and confusion ; of suggestiveness to aid the memory ; of brevity to save time and trouble, it is hardly necessary to speak.

Regarding the systems now in use in our best shops, this paper will not attempt detailed information. It is understood that the names are more or less scientifically arranged; depending, of course, upon the amount of study and the quality of the brains that have been expended upon them. In cases where symbols are used, supplementary to the names, they usually consist of letters or numbers, or (oftener) a combination of both.

TABLE A.

1st. Full name of machine and piece.	2nd. Our symbol for it.	3rd. Symbolic name as often used.	4th. Characters in Col. 2.....	5th. Characters in Col. 3.....	6th. Excess of Col. 5 over 4.. ...
6″×4′ Engine Lathe, spindle head..	E L A—4	Engine Lathe, A—4.....	4	13	9
No. 4 Power Press, frame.....	P P D—1	Power Press, D—1.....	4	12	8
7″×14″ Steam Engine, crank shaft..	S E G—51	Steam Engine, G—51	5	14	9
Buckeye Mowing Mach., left axle nut	M M D—81	Mowing Machine, D—81...	5	16	11
No. 3 Glass Clock, main spring.....	G CC—105	Glass Mantel Clock, C—105.	6	20	14
One-hole Mouse Trap, choker wire..	M T A—3	Wooden Mouse Trap, A—3.	4	17	13

TABLE B.

FPL — No. 3 FOOT PRESS. — Weight.

Piece Number.	Same as	Piece Name.	Material.	Quantity.	Rough weight.	Finished weight.	Aggregate finished weight.
1		Frame	Cast Iron.	1	220	200	200
2		Gib	"	1	10	9	9
3		Slide Bar	"	1	45	40	40
4		Front Leg	"	2	30	30	60
5		Back Leg	"	1	40	40	40
6		Treadle	"	1	17	15	15
7		Lever	"	1	85	80	80
8	FPH-8	Lever Weight	"	4	5	5	20
9		Pitman	"	1	12	10	10
10	FPH-10	Clamp Sleeve	"	2	3	2¼	4½
21		Lever Pin	Steel.	1	2½	2	2
26	FPJ-26	Treadle & Pitman Bolt	Iron.	3	¾	½	1½

Many of them (both names and symbols) fail in symmetry and suggestiveness, because little attention has been paid to the names of the machines themselves, as regards the serial consecutiveness, hinted at in paragraph 2nd. The quality of brevity often suffers severely, because the name and symbol must, in most cases, each have the machine name prefixed, to secure their perfect isolation. The latter quality is rarely dispensed with, simply because the manufacturer's pocket would be too directly touched by the expensive resulting mistakes. A perusal of some machinery catalogues which give detailed lists of parts is very harassing to a systematic mind. They are apt to derive one part name from another, prefixing the latter as an adjective each time, until some such pleasant title as "lower-left-hand-cutting-blade-set-screw lock-nut" is evolved. If there are symbols provided, they consist of some unknown combinations of letters part way down the list, and then change to arbitrary numbers, or perhaps to nothing at all. It will often be noticed also that no particular order appears to be followed in numerical arrangement, similar parts being scattered at random through the list.

The scheme to be described further on has been evolved gradually from the experience gained in managing a growing machine business. This scheme is far from perfect, and is probably inferior to others which have not been made public; but it seems to answer the purpose aimed at, viz.: a comprehensive and elastic system which will accommodate itself to an unlimited growth and any variation in quantity or kind of goods manufactured. This, the methods we first tried would not do, being too limited in their scope.

It should be here explained that the word "We," as just used, refers to the above mentioned machine works, with which the writer has long been connected; and the scheme in question will be spoken of as "our symbol system." To further define terms: "machine name" and "machine symbol," refer respectively to the name and symbol of the whole machine—or other article of manufacture; for it will be noticed that the system is applicable to almost any products, except those of a textile or chemical nature. "Piece name" and "piece symbol," in like manner, refer to the separate pieces of which the whole is composed. The terms "detail," "part," and "piece," have so far been used synonymously. It is doubtful which is really the best to establish as a standard, but we have adopted "piece," as best expressing the idea of one piece of material, reduced to the last condition of subdivision. In our practice exceptions are made to this requirement of homogeneousness in such cases as chains, ropes, belts, etc.,—also material glued or welded together—in short, anything which may (like a man) be called *one piece*, because it is not intended ever to be taken apart. The character for equality (=) will be used to show connection between a name and its symbol. A brief glance at the history of our system shows that at first we (like many others) hit upon the plausible idea of using numbers for machine symbols and letters for piece symbols. The numbers were somewhat "gapped," but not to such an extent as we now should practice. Examples: If four sizes of pumps were symboled 1, 2, 3 and 4, their barrels might = 1-A, 2-A, etc., and their handles = 1-B, 2-B, etc. If the next product made was a series of lathe dogs, they would probably be symboled 11, 12, 13, etc. Their frames would = 11-A, 12-A, etc., and their screws 11-B, etc. This all worked beautifully until the products became so complicated as to contain more than 26 pieces! After tampering a little with the Greek alphabet (which seemed calculated to scare our new workmen), and trying to use a mixture of small and capital letters (which looked too near alike), we fell back upon the clumsy device of repeating the alphabet, with letters doubled or tripled.

When we finally abandoned the above plan, several methods were carefully studied. The next most obvious was to use letters for machines and numbers for pieces. This allowed any quantity of the latter, but limited the machines to 26, even with no gaps provided. A certain modification of this method is, perhaps, more in use than any other system. In it letters are used for different sizes or styles of a certain kind of machine, and used over again for some other kind, *ad infinitum*. This answers the purpose, because there are not likely to be more than 26 varieties of one machine. It has, however, the fatal objection of requiring the whole machine name prefixed to each symbol, in all cases where the symbol stands alone, and does not happen to be written with the others of the set in tabular form. As the general name of a machine usually consists of at least two words, a complete piece symbol becomes too long for convenience in labeling. Examples : Force pump, K—26; Lathe dog, H—2.

Another system consists in using numbers for the machines and numbers for the pieces. This gives isolation and brevity, but no suggestiveness. A serious objection to it is the danger of blurring the numbers together, or of transposition in writing or reading them ; also in the fact that either number cannot be used alone, as it can in the case of letters and numbers.

A similar system to the above consists in the use of letters for both symbols. It has the same disadvantages, and the additional one of a limitation in the quantity of letters at disposal.

Our system, as finally decided upon, is as follows :—Machine names and piece names are determined by the designer, in general accordance with the principles already pointed out, being, of course, made as brief and suggestive as possible, with no two machine names alike, and no two piece names alike in the same machine. In this nomenclature no positive laws can be followed but those of common sense and good English. A *machine symbol* consists of a group of *three* arbitrary *letters*—capitals. A *piece symbol* consists of an arbitrary *number* and follows the machine symbol, connected by a hyphen ; thus FPA-2 might symbolize the force pump handle before alluded to—smallest size. The machine symbol may be used alone when required, as FPA.

As thus described, these symbols fully possess the qualities of isolation and brevity. To make them also suggestive, some attention must be paid to what letters to use. In practice, we aim to make the first two letters the initials of the general name of the machine, and the last letter one of an alphabetical series which will represent the sizes of the machine. An example of this is shown in the symbol for the smallest-sized force pump F P A. If there is any chance of a future smaller or intermediate size, gaps should be left in the alphabetical order. This "initial" method cannot always be strictly followed, because of such duplicates as F P A for force pump and foot press. The remedy would be to change one initial for one beginning some synonymous adjective, that is, foot presses might be symbolized T P A, assuming that it stands for treadle press. Usually the least important machine should be thus changed. From this it will be seen that, in defining the theory of this scheme, the words "arbitrary letters" were purposely used. The idea is to make the system thoroughly comprehensive. There might be such a number of machines having identical initials that the letters would be almost arbitrary. In practice, the designer can usually succeed in making the symbols sufficiently suggestive.

In considering how many letters to use in a symbol, considerations of brevity advised two, suggestiveness three or four. Two letters did not allow of enough permutations, nor indicate well enough the kind and size of machine. Three seemed amply sufficient in the first respect, as it provided over 17,000 symbols. If, for any reason in the future, four letters should seem desirable, the addition of another would not materially change the system. If three letters hyphened to a number of one, two or three digits should seem bulky, remember that this symbol can stand by itself anywhere and express posi-

tively the identity of the piece. Its comparative brevity is shown by comparing the second and third columns of the following table (A). In the different lines an idea is given of the application of the system to a variety of products not usually made in any one shop.

Table *B* is a specimen of part of a page of our "Symbol Book," in which are recorded any machines which have arrived at such a state of perfection and salability as to be marked "Standard" on our drawings.

This table almost explains itself. The piece numbers in 1st column do not have the letters prefixed, because the latter stand at the top of the column. "Same as" means that the piece is identical with a piece belonging to some other machine, and can be manufactured with it. If it is common to several machines in a set, the smallest of the set in which it occurs is given. The "quantity" column tells the number of pieces of a kind required. The last "weight" column, added upward, shows total weight of machine. The piece numbers are "gapped" after each kind of material, and also at the ends of "groups," as described further on. This is to allow for future changes and additional pieces; also that other nearly similar machines having more pieces may in general have the same piece numbers.

The order in which the pieces are numerically arranged cannot follow positive rules in all cases. In our list of instructions (too long to be here quoted) we direct a classification by *materials*. In each class we group pieces of the same general character, in regard to the prevailing work to be done upon them, and in natural "machine shop" order; i. e., first planing, then drilling or boring, then turning. We also aim to place the heaviest and most important pieces first. Between each group we "gap" the numbers.

Regarding position in naming pieces, we assume a front to the machine (where the operator is most likely to be placed), and define direction tersely as "forward," "back," "right," "left," "down," "up." The adjectives of position prefixed to piece names are, of course, derived from these words, as "upper," "lower." etc. A perpendicular row of similar pieces, say 5, would be rated upper, second, third, fourth and lower. A number of different-sized pieces of similar name, may, in like manner, be prefixed smallest, second, third, etc.

Before closing, a brief reference to certain (two) supplementary symbols may not be out of place. One is a small letter after a piece symbol (as FPL–21–a), signifying that the piece is obsolete, the standard FPL–21 having been altered. After a second alteration, the last obsolete piece would be suffixed "b," and so on. Thus duplicate pieces of old style machines can be identified and supplied to customers. The other symbol referred to is to indicate the number of the operation in the construction of a piece, and is written thus: FPL–21–1st, FPL–21–2nd, etc. Its use is of great value on detail drawings, time cards and cost records.

An English journal devoted to the stationery trade has just been interviewed by a Chicago salesman, who went across the water for the purpose of introducing specialties, and characterizes the comparative enterprise of English and American manufacturers in that line of business as follows:

No English house ever had the push and enterprise to send a man four thousand miles to sell its books. No English house ever thought of advertising its books in the four quarters of the globe, as the Chicago house does, for our Yankee friend showed us notices of his wares in the Sierra Leone *Herald* Bombay *Times* and the Melbourne *News*, which he carried in his satchel. This is the kind of push and enterprise that is running English goods out of the markets of the world, sending coals to Newcastle, cutlery to Sheffield, cottons to Manchester, and books and stationery to London. Our Yankee friend came to London with his carpet bag, and found, after canvassing, such a demand for his goods that he will open a store for the permanent sale of his wares, as soon as a convenient location can be found.

A Raleigh man promises to show a cotton-picking machine at the Atlanta Exposition.

Coffin's Averaging Instrument.

By Prof. John E. Sweet.

A PAPER READ BEFORE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

This opportunity of presenting a new invention gives me much pleasure. The invention, I fancy, must be of scientific interest to the technical members, and of practical interest to all who have anything to do with a steam-engine indicator. It is a little instrument or device of the nature of a polar planimeter, but one that goes beyond, and gives, without any mental or mathematical calculation whatever, the average width of the card. It determines two points whose distance apart, if measured with the scale which corresponds with the indicator spring, shows at a glance the mean effective pressure of the steam.

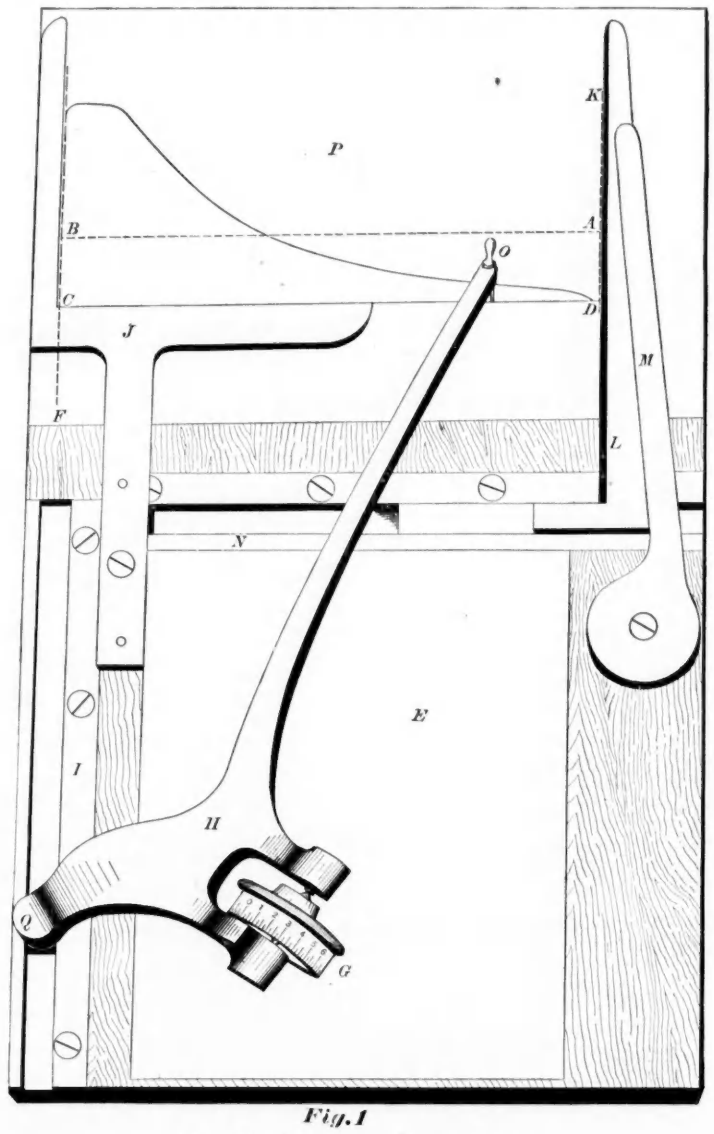


Fig. 1

Coffin's Averaging Instrument.

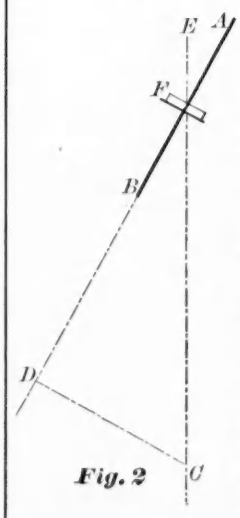


Fig. 2

The instrument, as shown at *H* in Fig. 1 of the accompanying engravings, is a small affair, almost the essence of simplicity, and it is arranged to go in the till of a steam engine indicator box. It is the invention of John Coffin, a young man of whom I have had occasion to speak before. To use the instrument, it is only necessary to place the indicator card *P* under the clamps *J* and *L* provided, and adjust one end of the card to exactly correspond with the edge of the stationary clamp *J*; then move up the sliding clamp or T-square *L*, guided by the groove *N*, so that its edge will correspond with the other end of the card. This clamp, when once adjusted, is held by the spring *M*. The tracing point *O* should be placed at *D*, and the pivoted block, at the end *Q*, placed in the groove *I*. Set the wheel *G* at zero, and start with the tracing point where the card touches the T-square at *D*. Trace around the card with the tracer until it arrives at the starting point, and make a slight indentation in the paper at *D*. So far, the action and the result have been the same as the polar planimeter, and the area of the card can be read off from the wheel in the same way. But continuing the operation by carrying the tracing point *O* along the T-square *L*, until the wheel again returns to zero, and making another indentation, the distance between these two indentations will be the average width of the card.

The reading of the above paper was listened to with much interest by those present. The following explanation of the instrument, shown in Fig. 1, has been furnished the American Machinist by the inventor:

The action of the wheel *G* in this instrument is, in principle, like the polar planimeter. Referring to Fig. 2, let *A B* be the axis, and *F* the wheel; then, if the axis is kept parallel with its present position, and the device moved down the line *E C*, the wheel will be rotated through a space equal

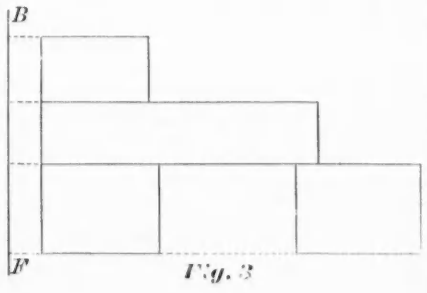


Fig. 3

to *D C* on its circumference, 1or the result is the same as if it were slid down the line *A D* and then rolled on the line *D C* to *C*. This is apparent if one imagines the wheel to have teeth, and the paper (shown at *E* in Fig. 1). also to have a corresponding set of teeth parallel to the axis. Now take a figure like the one shown in Fig. 3. All the motion the wheel gets in traversing the horizontal lines will be neutralized by a corresponding motion in the opposite direction. In traversing the vertical lines, the wheel indicates an addition or subtraction. For instance, in traversing the rectangles represented by dotted lines extending out to the line *B F*, going in one direction indicates addition, while going in the opposite direction indicates subtraction, so that it is plain the result must be the area of the figure. Any figure may be broken up into a number of steps, as shown in Fig. 3, and measured correctly. As the correctness of the machine in measuring areas has been proven, its averaging function may now be subjected to a like test. Taking, for example, the irregular-shaped card *P*, shown in Fig. 1, the card touches the parallel vertical lines *B F* and *D K*. We have started at *D*, traced around the card, and find the area to be 3½. With the tracing point at *D*, we set the wheel at zero, and trace up the line *D K* until the wheel reads "3½," or an amount corresponding to the area of the irregular figure represented by the card. We will suppose the point at which this occurs to be at *A*. Then the rectangle *A B C D* has the same area as the irregular figure or card, and the side *A D* is equal to the average height of the figure representing the mean effective pressure upon a card, and may be measured by the scale corresponding with the spring used in taking the card. The same result would be attained by starting at *D* and going around the figure to the right, and then up the line *D K*, until the wheel indicates zero.

LETTERS FROM PRACTICAL MEN.

Weighting the Safety Valve—A Defect in Oldham's Shaft Coupling.

Editor American Machinist:

The communication by "Quirk" in a recent number of your paper, in relation to the actual power derived from engines by mill owners, reminds me of an instance in point.

The owner of a steam saw mill once asked my opinion as to the horse power developed by his engine, which was of the ordinary horizontal pattern, with a simple D valve, intended to cut off at ¾ stroke.

I told him that the engine would rate about 30 H.P. at ordinary pressure and speed. He was confident that it did more, and, on further inquiry, I found that he had moved the eccentric back until the angular advance was nothing, thus using the steam through nearly the whole stroke, destroying the lead and delaying the compression. The arrangement was certainly not economical, and I hinted as much; he replied that he did not care how much steam it took, as he used the waste for fuel, but simply desired to get all the work possible from his engine, rather than go to the expense of buying a larger one.

The diagram from this engine would probably have shown as a rectangle, with no expansion or compression curves. Of course the engine pounded.

By this arrangement, and by hanging a few pieces of old iron on the safety (?) valve lever, he managed to get over 50 H.P from a 30 H.P. engine. He will probably keep on this way until, like the "one-hoss shay," both engine and boiler give out together, and then he, or his widow, can take the insurance money and start again.

Oldham's coupling can be used where the two lines of shafting are strictly parallel, but have a small relative offset. It cannot be used on shafting which does heavy work, on account of the obliquity of the pressure which causes the sliding. As a universal joint for "crooked" shafting, it is inferior to the ordinary clutch coupling, which is much simpler and easier to fit up.

C. H. B.

Another Rule for Cutting Screw Threads on the Engine Lathe.

Editor American Machinist:

Seeing in your paper so many requests for information on the subject of making calculations for the number of teeth in gears for cutting screw threads with the engine lathe, I am impelled to give a very simple rule, one which was taught me by the foreman of the shop where I served my apprenticeship. Here it is: Multiply the number of threads to the inch in the lead screw by any convenient number, and place the product on the stud; then multiply the number of threads to the inch which it is desired to cut, by the same number, and place the product on the screw, and it is done. If it is found that the first attempt does not give a number which you have, then try another multiplier, until one is found which does.

I am working daily on a Pratt & Whitney

lathe, and I make the calculation mentally, and in less time than I can take down the index, which is glued to a board and hangs on the wall over the lathe.

Example :—I want to cut 14 threads to the inch. My lathe has a lead screw, with six threads to the inch, but it is double geared in the head stock ; so I call the 6, 12—thus :

$12 \times 3\frac{1}{2} = 42$ for stud ; and
$14 \times 3\frac{1}{2} = 49$ for screw.

SHORT CUT.

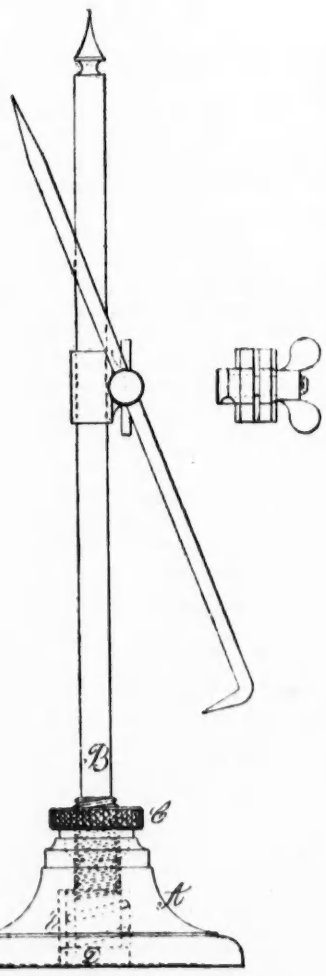
Waterbury, Conn.

Ready Annealed Steel.

Editor American Machinist:

Now that the question of annealing steel is under discussion in your journal, I venture to express a thought that I have entertained for years. That is: Why do not steel manufacturers put into the market all sizes and sections of annealed steel? They certainly have, or could have, better facilities for annealing steel than the many who use it in small quantities, and would have the same trade incentive to furnish the best annealed steel that they have now with the unannealed. There is a large quantity of bar and sheet steel used, without forging to shape, which is often spoiled by unskillful and faulty annealing. This waste, it seems to me, the consumer would willingly avoid by paying the increased cost necessarily involved in producing annealed steel ready for use. JOSEPH HOSKIN.

Waltham, Mass.



Adjustable Surface Gauge.

Editor American Machinist:

In your issue of March 19, 1881, is a drawing and description of an adjustable surface gauge, which is very good indeed, but perhaps may be a little difficult to make. I also think it is better to make the adjustment at the base, rather than at the top.

I enclose a drawing and description of a gauge, which seems to me to be simple and effective. In the drawing, *A* is the base, *B* the standard, *C* the nut, *D* the standard head, and *E* the slot in the base.

Through the base *A* is drilled a hole $\frac{1}{2}$" in diameter, which is enlarged from the under side to $\frac{1}{16}$" in diameter to make room for the spiral spring, as shown. This hole is also enlarged from the upper side to $\frac{1}{16}$", in which enlargement the nut *C* is fitted, to keep the spindle properly centered. The head *D* forms a bearing for the spiral spring. In the slot *E* a feather in the head works easily, its purpose being to keep the standard from revolving, while adjusting the nut. The other parts need no explanation.

JOHN FRANZEN.
Browne & Sharpe M'f'g Co.,
Providence, R. I.

Continuous Pulley Line Shafting.—Tool Post for Lathes.

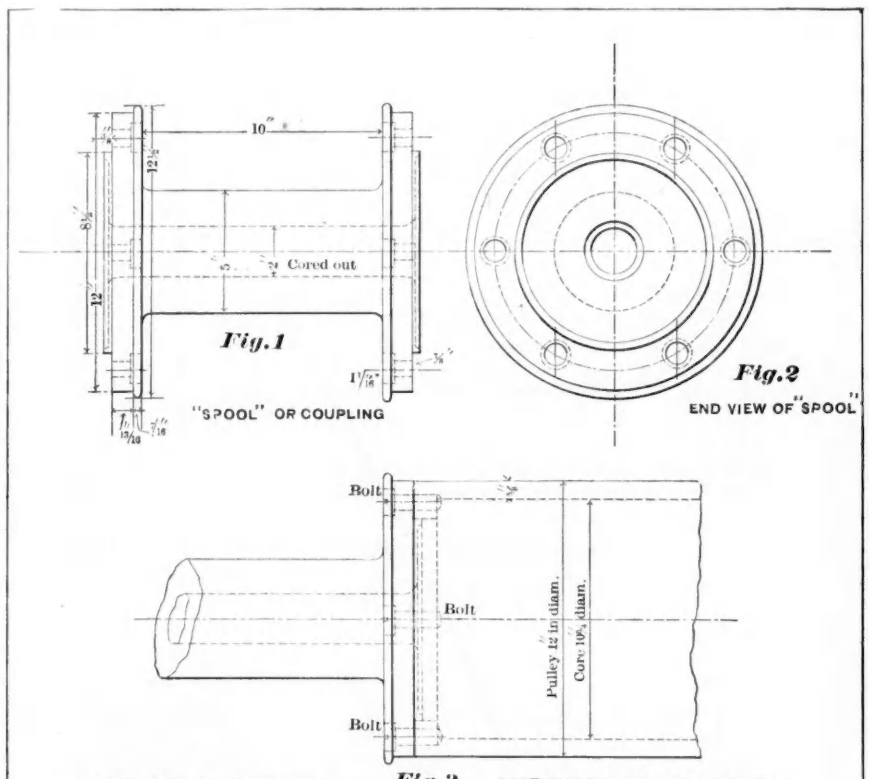
Editor American Machinist:

If the interest manifested in the columns of the AMERICAN MACHINIST in connection with shafting and couplings has not abated, I beg to offer my mite to the general fund, trusting it may prove interesting.

Doubtless many of your readers have never seen the style of shafting, or rather, continuous pulley, and combined coupling and journal, used by the Colt's Patent Fire Arms Mfg. Co., of Hartford, Conn., therefore I take pleasure in sending some sketches I have lately made of it.*

Facilities to do this were kindly afforded me by Mr. Kinne, foreman of the general machinery construction department of the Colt Works.

Fig. 1 shows the coupling and journal combined; or "spool," so called from its resemblance to that article. Fig. 2 shows an end view of the same, giving location of bolt holes through which the pulley, or drum, is fastened to the coupling; and Fig. 3 shows a portion of said coupling attached to the drum.



CAST IRON COUPLING AND JOURNAL FOR CONTINUOUS PULLEY AS USED AT COLT'S ARMORY, HARTFORD, CT.

Main dimensions are shown on the sketches, and the drum or pulley is made in eight or ten feet lengths. Weight of coupling finished, is 112 pounds, and a drum eight feet long, 288 pounds. The speed at which this shafting is here run, is 130 revolutions per minute. An ornamental cap piece is used on the extreme ends of each line, giving the whole a pleasing appearance.

This system, I believe, originated with Messrs. Wm. Sellers & Co., of Philadelphia, who first supplied the Colt Co., and a large part of what the latter now use has been in constant service since about 1855, except when the works were destroyed by fire some years ago. The company have now in daily use over 3,300 feet, running so noiselessly and truly in adjustable hangers, as to give the impression to the casual observer that it is at rest.

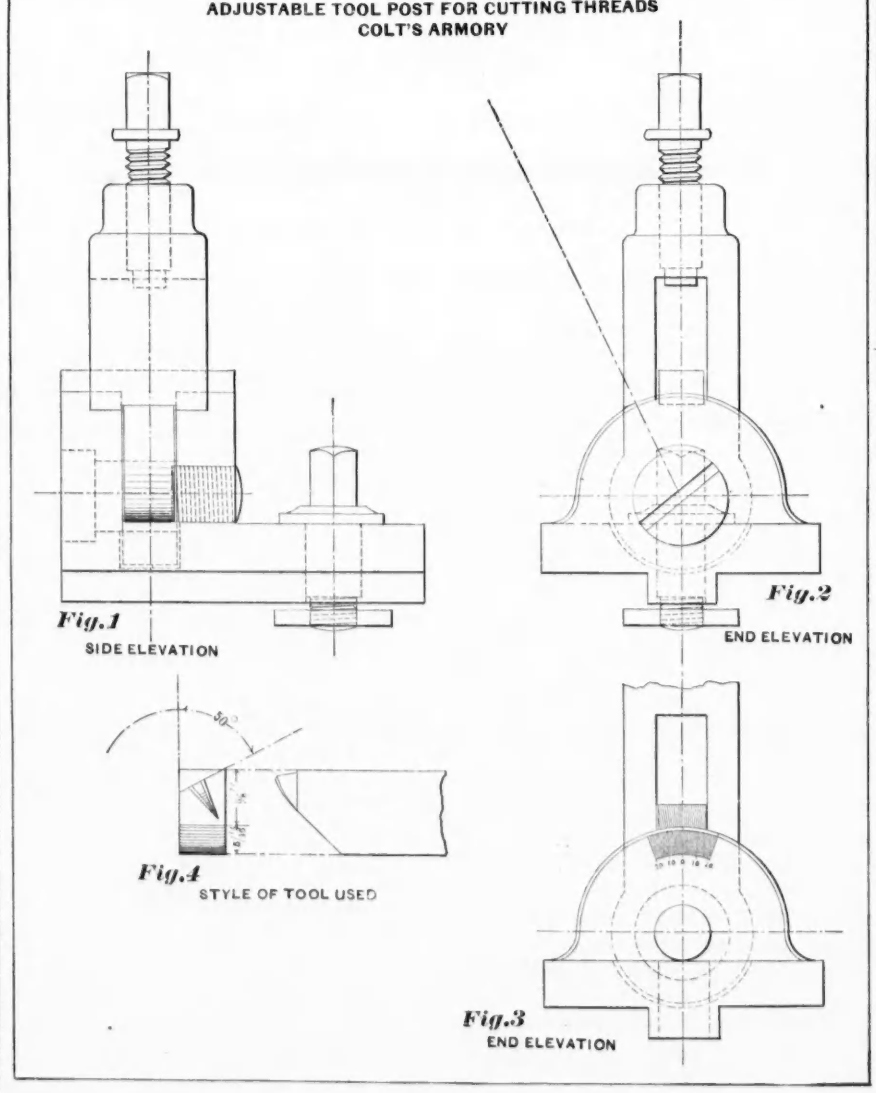
In connection with novel tool posts for lathes, I offer a sketch of one kindly shown me by Mr. E. B. Kilbourn, foreman in charge of the tool making for the general machinery department at Colt's Armory.

As will be seen, it is adjustable, and is used in cutting screw threads, the object being to readily adapt the cutting tool to the angle of the desired thread.

Fig. 4 shows a form of thread tool used here in the ordinary tool post to some extent, but being expensive to fit up, the adjustable post proves its superiority, as an ordinary tool can then be used. A. H. CAMPBELL.

Hartford, Conn.

ADJUSTABLE TOOL POST FOR CUTTING THREADS
COLT'S ARMORY



* This shafting was noticed by Chordal in our issue of Sept. 20, 1879.

Attaching the Head to T Squares.

Editor American Machinist:

As to attaching the stock or head to wooden T squares for drawing, I consider the method of Prof. Sweet, in your issue of July 16th, so far superior to all others, that I feel bound to say a word against other methods, such as recommended in your issue of July 30th, page 6.

In using the triangle and T square together, it is often necessary to slide the triangle out so that it partly overhangs the drawing board. This is most likely to occur at the stock end of T square. When the blade of the square is in any way mortised into the head, one side of the latter, when in use, rises or stands with its upper surface above the plane of the drawing board. Then, in sliding the triangle to partly overhang the edge of the board, that part of the stock or head of T square which stands above the level of the surface of the board, becomes a fatal obstruction to sliding in the direction of the stock.

If the triangle is 6 or 8 inches on a side, its edge, which is perpendicular to the blade, if square, cannot then be brought nearer than the 6 or 8 inches of the edge or drawing board, without a collision with the head of square, that is, when the edge of triangle sliding against the blade, has the acute angle toward the head, as is most usually the case.

S. W. ROBINSON.

Mechanical Department Ohio State University.

Among the latest uses to which it is proposed to put the electric light is the illumination of rivers to permit the rafting of logs at night. The Muskegon Boom company will be the pioneer in this direction. In Baltimore experiments have been made with a view of illuminating water at night to a depth of 200 feet. Such a means of illumination, it is believed, would be of great service in searching for lost treasure and drowned persons, in raising wrecks, removing torpedoes, and other subaqueous labors. —*Industrial World.*

An iron company in England is introducing the use of concrete slag for building purposes by the force of example. Its new offices near Leeds have all the door and window facings and the ornamental work, usually stone, made of this hitherto waste material. There is quite a display of imitation carved bricks, in various colors, made of the slag, the cost of which is said to be 50 per cent. less than the real article of clay, which hitherto has been so much in fashion. The company also supplies the Midland and Northeastern railroad companies with slag concrete flags, ready for use in the laying down of platforms at railroad stations.

Engine Lathe at the New England Fair.

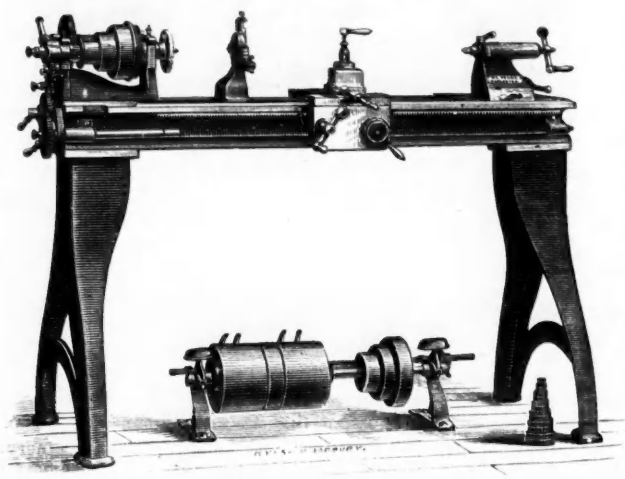
The increased demand for the products of nearly all the machine shops in the country, and the fact that this demand is for machinery and machines of high excellence, has in turn created a call for more and better machine tools. As might have been foreseen, this call is being met by the production of tools of materially improved design and construction.

The accompanying engraving represents a 12″ engine lathe, with a 5 foot bed, recently brought out by W. C. Young & Co., Worcester, Mass. It is claimed to meet the requirements of the day by possessing strength in all its parts, and, at the same time, the quality which is usually described by shopmen as being "handy."

The leading screw, and in fact all screws and studs, are made of steel.

The general appearance of the lathe, as to the quality of neatness, is so well set forth in the engraving as to require no especial mention.

One of these lathes, not built for show, but taken directly from stock, is now on exhibition at the fair of the New England Manufacturers' and Mechanics' Institute, Boston, Mass.



NEW ENGINE LATHE.

Coney Island hotel proprietors lost $50,000 on a recent rainy Sunday. This is the way they figure it: Provisions bought for the occasion, $800: what they would have sold for had guests arrived, $50,800; loss, $50,000. —*Philadelphia News.*

Notwithstanding theory would indicate that in heating large rooms by steam pipes the pipes should be placed near the floor, it is now quite generally conceded by those who have tried both plans, that better results are obtained by locating them overhead

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In a recent discussion of papers read at a meeting of the Institution of Mechanical Engineers, England, some valuable practical remarks were made by Mr. Webb, of Crewe, who stated that he always sponged the two inside surfaces of a joint with hot water and sal ammoniac, to eat off the magnetic oxide, before putting the plates together in his locotive boilers. Unless this were done, the oxide would generally get hammered off in some places and left on in others; and where it was left on, it got pounded to powder in the act of riveting, and was so left between the plates, in which case the steam got in and cut away the joint.

Another member's remarks were valuable and practical to the effect that if the plates of a boiler were double riveted, and bent cold after punching, there was a sharp bend to be observed in the plates along the inside row of rivet holes, which was very bad. In such cases, a boiler maker supposed he was getting extra strength by a double row of rivets, whereas he was really making that part a weak place in the boiler.

Fair of the New England Manufacturers' and Mechanics' Institute.

This exhibition opened in Boston, Thursday, August 18th, at 11 A. M., with fine prospects of success, though quite a number of exhibits were not yet in place, owing to the pressure of general business on exhibitors. The building alone covers an area of about five acres, or about 207,000 square feet. The machinery department occupies about 125,000 square feet of floor space.

There are a number of steam engines on exhibition, among which are the Hartford Engineering Company's new Buckeye, built at Hartford, Conn.; the Porter-Allen, built by the Southwark Foundry & Machine Co., Philadelphia; the Fitchburg, built by the Fitchburg Steam Engine Co., at Fitchburg, Mass.; the Kendall & Roberts, of Cambridgeport, Mass.; the Exeter Machine Company's engine, built at Exeter, Mass.; and one built by the Swamscott Machine Co., of New Market, N. H.

Kendall & Roberts also exhibit a pair of horizontal tubular boilers, which are to furnish steam to several of the engines on exhibition.

The Deane Steam Pump Co., of Holyoke, Mass., exhibit an independent condenser, arranged to connect with the Hartford engine, when it is run condensing.

The Knowles Steam Pump is to be exhibited, but is not yet in place.

Hill, Clarke & Co., of Boston, exhibit the Otto silent gas engine, built by Schleicher, Schumm & Co., Philadelphia, to which a passenger elevator is attached.

Geo. H. Corliss, of Providence, R. I., exhibits a model of the sewage pumping engine, about which so much controversy has arisen with the city of Boston.

Merrill & Woodbury, of Boston, exhibit a hot air engine, which is intended to drive the electric lights with which the outside front of the building is lighted.

The Billings & Spencer Company, of Hartford, Conn., exhibit drop forgings in great variety, both rough and finished, including wrenches, screwdrivers, tool-handles, lathe-dogs, ratchet-drills, head-screws, gun and sewing machine trimmings, pliers, jewelers' anvils, &c., &c.

The Fairbairn Grate Company, of Boston, exhibit Fairbairn's hollow grate bar.

Goodnow & Wightman, of Boston, have on exhibition a fine line of small tools for machinists' use, together with a variety of hardware.

W. C. Young & Co,, of Worcester, Mass., among other specialties, exhibit engine lathes, an illustration of one of which appears on this page.

The Providence Tool Company, of Providence, R. I., exhibit an extensive assortment of screws, nuts, washers, links, &c., together with guns, rifles and machines for sewing leather.

John Matthews, of New York, exhibits a full line of his soda water apparatus.

W. A. Davis, of 172 High St., Boston, exhibits vises made by the Prentiss Vise Co,, New York, lathe chucks made by the Pratt & Whitney Co., Hartford, Conn., and Union Manufacturing Co., New Britain, Conn.; sensitive drills made by Dwight Slate, Hartford, Conn., and a line of screw cutting tools made by the Billings & Spencer Co., Hartford, Conn.

The machine tool exhibit will suffer seriously from the inability of most of the manufacturers to keep up with regular orders.

Other machinery exhibitors, including textile, leather working, etc., are:

Hawkins Machine Co., Boston.
Nathan & Dreyfus, New York.
Walworth M'f'g Co., Boston.
T. J. & T. H. Gifford & Sons, Salem, Mass.
Fisher & Norris, Trenton, N. J.
Salem Foundry and Machine Co., Salem, Mass.
Merrill Bros., Brooklyn, N. Y.
Ross Loom Co., 85 Water St., Boston.
Washburn & Moen M'f'g Co., Worcester, Mass.
Chapman Valve Co., Boston.
Gifford Bros., Hudson, N. Y.
Curtis & Marble, Worcester, Mass.
National Water Meter Co., 95 John St., New York.
Union Water Meter Co., Worcester, Mass.
Continental Water Meter Co., Boston.
Boston Water Meter Co., Boston.
Boston Hydraulic Motor Co., Boston.
National Water Wheel Co., Bristol, Conn.
Cranston & Co., Brooklyn, E. D., N. Y.
The Acme Co.. Boston.
S. B. Everett, 21 Charlestown St., Boston.
B. F. Sturtevant, Boston.
I. B. Davis & Son, Hartford, Conn.
Geo. Frost & Co., Boston.
Geo. Draper & Sons, Hopedale, Mass.
Kitson Machine Co., Lowell, Mass.
C. E. Kimball, 128 Oliver St., Boston.
Ashton Valve Co., Boston.
Stanley Rule and Level Co., New Britain, Conn.
Young & Wheeler, 55 Haverhill St., Boston.
James Smith Woolen Machinery Co., Philadelphia.
Pettee Machine Works, Newton Upper Falls, Mass.
Ezra Sawyer, Worcester, Mass.
Mason Machine Works, Taunton, Mass
H. W. Butterworth & Sons, Philadelphia.
Johnson & Bassett, Worcester, Mass.
Crompton Loom Works, Worcester, Mass.
Lowell Machine Shop, Lowell, Mass.
Prouty Press Co., Boston.

The opening address was delivered by Governor Long, and was eloquent though brief. The speaker closed by introducing Hon. Geo. B. Loring, U. S. Commissioner of Agriculture, and an honored citizen of Massachusetts. The speech comprised an interesting and eloquent review of the progress and present status of American industries.

A feature of the day and evening was the presence of the Governors of a number of States at the Exhibition, and afterward at what was designated as the Governor's dinner.

Some of the exhibits of textile fabrics were very noteworthy, among which may be named the following:

James L. Little & Co., Boston.
E. R. Mudge, Sawyer & Co., Boston.
Cheney Bros., South Manchester, Conn.
Barker Mills, Auburn, Me.

The general arrangement of the main floor and balcony exhibits is well shown in the engraving presented herewith.

As already stated, many of the exhibits are not yet in place, but the show, as a whole, is a good one. As other exhibits are placed in position we shall take occasion to present further details in later issues.

DIAGRAM OF THE BALCONY

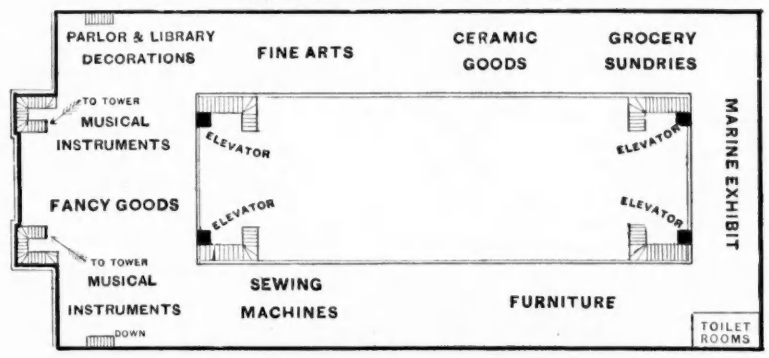
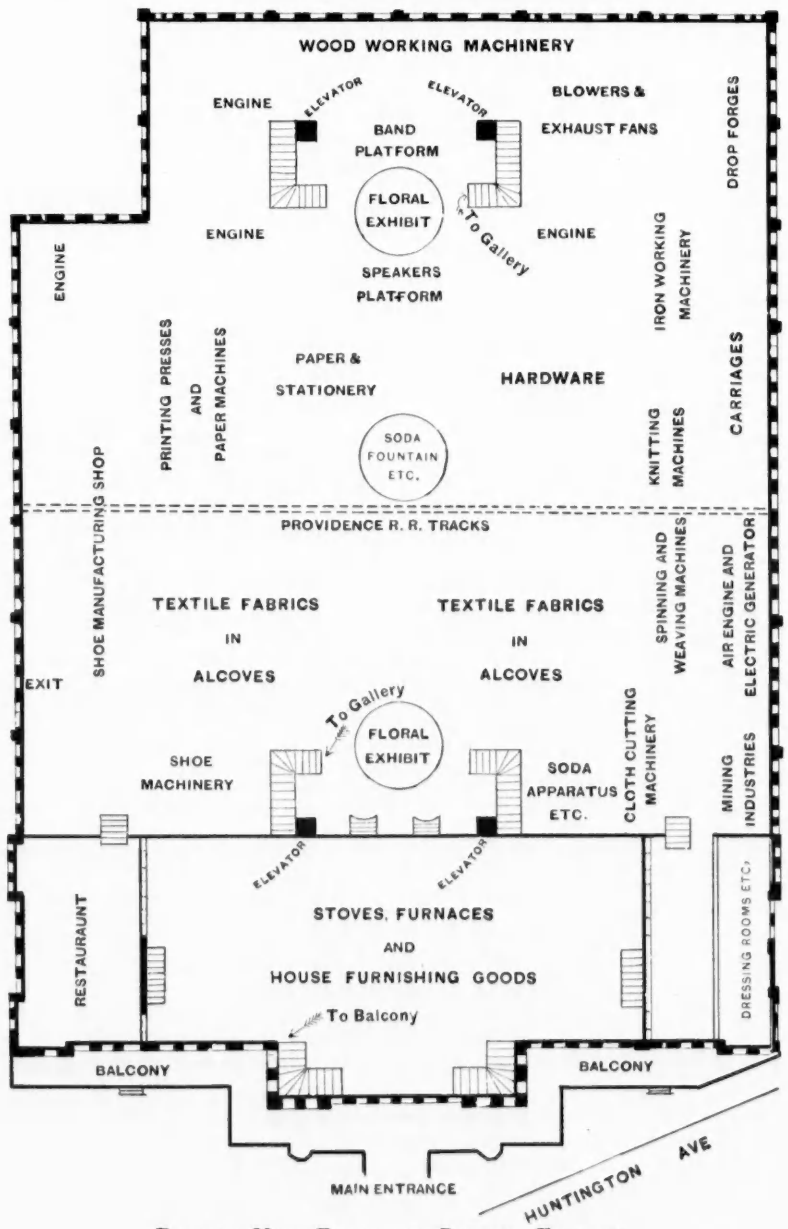


DIAGRAM OF THE MAIN FLOOR



PLAN OF MAIN FLOOR AND BALCONY EXHIBITS.

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☞ *Every correspondent, in order to insure attention, should give his full name and address, not for publication, but as a guarantee of good faith.*

☞ *We are not engaged in procuring patent rights, or in selling machinery; nor have we any pet scheme to advance, or hobby to ride.*

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☞ *Subscribers can have the mailing address of their paper changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once.*

NEW YORK, SEPTEMBER 10, 1881.

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The printed date on each wrapper shows the time to which the subscription is paid. We discontinue the paper in all cases when the time paid for has expired, unless renewed.

Safety of Excursion Steamers.

The course followed by the owners of the steamer Plymouth Rock, together with that of the United States Inspectors, since the accident off Sandy Hook, August 17, 1881, has proved conclusively that there is something radically wrong with the government methods of inspecting and controlling steam vessels. On the morning of August 18, 1881, the daily papers contained accounts of what came very near being a serious steamboat disaster. The steamer before alluded to, with about 500 souls on board, had broken her steam pipe off Sandy Hook, and a panic ensued, in which it was surprising that more or less persons did not lose their lives. The captain stated that the way the accident happened was as follows: "As the vessel sailed down the bay the sea became rougher and rougher, the boat rolled considerably, and a sea struck the guard under the starboard boiler, raising the boiler and steam pipe. The strain thus caused on the main steam pipe was so great that it broke, letting the steam escape." What followed the public should understand, notwithstanding the efforts made by interested parties to make it appear that, on the whole, the occurrence was but a trifling affair.

It was stated in the published reports of the accident that the necessary repairs would be made, and the boat be ready to make her regular trips on the following Saturday. This should have been made a little plainer; it should have been said that the steamer had barely escaped shipwreck this time, and on the next Saturday would be ready to try the same thing over again, and that a future opportunity would perhaps make the experiment more successful. One of the inspectors, according to a published interview, remarked: "None of the excursion boats in the harbor are fitted for travel in a rough sea, but the Plymouth Rock is as fully suitable for this as any of the others." The purport of this would seem to be that persons venturing to sea in any of the harbor excursion boats should settle up their accounts and arrange their earthly affairs before starting; and, if they have any choice of a conveyance out of this world, the Plymouth Rock is as good for that purpose as any of the other excursion boats.

Now, what we desire to know is: Since this inspector considers all of the harbor excursion boats unsafe in a heavy sea, how is it that the Plymouth Rock and other similar boats are given certificates allowing them to carry as many as 3,000 passengers? It is well known that all steamers running to Long Branch do put to sea, and are at times exposed to squalls and seas strong enough to wreck vessels much larger and built for sea-going trade.

The fact is, here is a golden opportunity for civil-service reform from a mechanical standpoint. No boats with boilers upon the guards should be rated as sea-going boats for passenger service, as they are dangerously unsafe.

The engine upon the Plymouth Rock rests upon the keelson, while the boilers rest upon the guards. The former is the most substantial part of any vessel, while the latter is the weakest. A steam pipe, 22 inches in diameter and $\frac{7}{8}$ inch thick, connects the two boilers with the engine. It is customary to use slip joints upon the horizontal parts of such steam pipes to allow for the working of the vessel in a sea way. We have known such joints to move $1\frac{1}{2}$ inches when the vessel was in a heavy sea. But there is no provision made for a vertical movement. Very many of the slip joints in use are allowed to rust up so tightly that they are practically of no use, and the pipes might as well be without them. In the absence of a device permitting vertical movement, a violent wrenching upon all the joints of the pipe ensues as the vessel rolls, which, when carried beyond certain limits, breaks the pipes.

When, from any accident, it becomes necessary to stop the engine in heavy weather, such a vessel will swing broadside into the trough of the sea, and the only hope of escape left for the passengers is that some vessel will come and take them off. The proper way to protect the lives of passengers, is by making excursion steamers safe for any duty that shall be required of them. Boilers cannot be securely fastened upon the guards, because the guards themselves are subject to constant vibration, and are constructed to support weight mainly. Furthermore, a heavy pressure from the under side, such as would be caused by a sea striking up under the guards, is liable to lift the guards from their support and wreck the vessel. Neither the Plymouth Rock, nor any other steamer of like build, should be allowed to run to Long Branch or any other place that requires an exposure to ocean seas and storms. The statement that there are plenty of life preservers on board, and that the machinery is all in perfect order, does not alter the fact, proved by long experience, that a steamer built with wide guards is not fit for sea-going uses. The law should not allow this matter to rest with an expenditure of $300 on the part of the owners, nor permit the boat in question to again resume her regular trips, incurring the same risks. Steamboat companies should be compelled to build boats with the boilers in the hold, where they ought to be. Our impression is, that had the steam pipe been $1\frac{1}{2}$ inches thick, instead of $\frac{7}{8}$-inch, it would have broken all the same.

One of the most pressing needs of the day is some means of locating the mechanical faculty in a boy's mind, if he has it, or finding out that he has no such faculty, enabling parents and guardians to decide intelligently regarding his future. Some of the boys who are now crowding into clerkships might in this way achieve positions as mechanics, while others would become clerks and salesmen with assured reason.

Intemperance and the Pay-day Question.

The Woman's National Christian and Temperance Association has issued a card requesting employers to fix upon some day other than Saturday as pay-day; alleging, in substance, that the workmen spend their wages for rum, Saturday night and Sunday, which they believe would go to their families if the pay-day were changed to any other day in the week.

While we would willingly say nothing that should stand in the way of temperance reform, we confess that we do not entirely share the views of the ladies who comprise this organization. It is in the nature of an attempt to legislate, or what is the same, to enforce morality. Such attempts are as old as society itself, and are apparently as unsuccessful as they are old. It has been a thousand times demonstrated, that to enforce a law in such a way as to make it answer the better purposes of life, it must first be written in the hearts of the people. If it can be demonstrated that intemperance is a crime, we believe it should be proceeded against under statutory enactment, exactly as any other crime is proceeded against. If it is urged that popular opinion is not in favor of such a law, then it is not a crime, or, the people need educating up to a better view of the case. In any event, while a man may be punished for the commission of a crime, he cannot be coerced into refraining from committing it. To compel a man to keep sober by cutting off his means of getting drunk, is in the enlightenment of the day hardly what is wanted. To keep him from spending the money riotously, that belongs to his family by right, by virtue of bringing him to see his moral obligation, is generally considered better. It might be possible to legislate, or coerce people into attending church on Sunday, but no one believes such a course would advance the cause of religion or morality. We fear the world, or any great portion of it, will never be materially reformed by compulsion.

With the question of the day of the week that may be selected for pay-day by those employing others, the public has, in the abstract, nothing to do. It is a matter which the contracting parties are competent to settle for themselves. To make, however, a change of the kind contemplated, and for the purpose avowed, is to say that the great body of skilled artisans and workingmen are not to be trusted to take care of themselves; an assertion which we believe to be not only uncalled for, but extremely impolitic. In respect to habits of intemperance, they do not differ materially from men in other walks of life. What of difference there may be is probably in their favor. It is difficult to see why reform should be leveled at them to the exclusion of other worthy subjects. The physician sometimes through intemperance neglects his patients, or the lawyer his clients; yet there is no talk of restraining them by fixing a time when their fees shall *not* be paid. In fact, throughout the world, and in all classes of society, intemperance in eating, in drinking, and in a hundred other ways, works evil, plain and palpable. If coercion is to be employed, why select any special class?

If the working men are expected to take kindly to propositions to enfore a change in their habits of life, made by those who are able to select for their headquarters a fashionable summer resort—propositions made neither to them nor through them—we fail to see the ground upon which such expectations are based. We believe the working men are competent to be a party to any contract which is to affect in any way their material or moral welfare. We believe, further, that it is offensive to them, and properly so, to be distinguished and set apart as a particular class in the community requiring special legislation or attention, and that it is contrary to the intentions of the institutions of our country thus to distinguish any portion of the people. We say nothing of the fact that the majority of those to whom this card is addressed, were themselves once in much the same condition as those they now employ, and may well be supposed to have an interest in their employes that neither needs, nor will take kindly, promptings from those who, as they will naturally conclude, know considerably less of the matter than they do.

But the case has another aspect. Perhaps it never occurred to these ladies that the great majority of those who are distinctively called working men are temperate in their habits, and devote their earnings to the support of their families; and that to some of them Saturday's pay means a good deal. It means to some who are employed in the suburbs of large towns the opportunity to spend their earnings for the benefit of their families when they have time to go where they can invest their earnings to the best advantage. Perhaps, even better than this, it enables them by providing some luxury not in the common order of every-day life, to consecrate to pleasant memories the only day they can devote to their wives and children. These are homely topics, but there is a large class in the country to whom they are great, even in their homeliness. It is a grave question whether, if possible, this class shall be deprived of what is to them a pecuniary and a moral blessing, in order that a doubtful experiment at reforming some one else may be tried.

If a discrimination against those who work for wages is to be made, why not go further and include only those who spend their week's wages over the bars, Saturday nights and Sundays; and since anything that has a tendency towards class legislation or discrimination should, it is generally conceded, be avoided, why not include all in the experiment who are in need of such restraining? The wise physician prescribes for the sick member rather than the whole family.

A certain passenger steamer makes a trip and returns in 71 hours. Ocean water is used in the boilers, and the astonishing feature is that the boiler is not blown off from the surface cock between ports.

The engineer says the owners believe it to be poor economy to waste coal by blowing off heat through the surface cock. The boiler is scaled once in doubling the route, but the quantity taken out is not named.

The cylinder has never been tapped for an indicator, nor has one ever been applied.

One of these days something may happen to convince these owners that their economy is short-sighted extravagance.

QUESTIONS & ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

(1) J. C., Norwalk, Conn., writes: I want to run a 1½″ shaft under water, at, say, 1000 revolutions per minute. What is the best material for the shaft and box, irrespective of strength? *A.* Shaft of steel and box of lignum-vitæ.

(2) R. C., Cohoes, N. Y., asks: What would be the advantage of pumping air into a boiler, say as much as could be used with the steam? *A.* We think if any very considerable quantity of air was thus used, there would be a material loss, so far as fuel is concerned. Pumps are sometimes arranged to pump from a tank into which the proper quantity of water to supply the boiler is allowed to run. In this way the pump, which is ordinarily larger than is really necessary, delivers a small quantity of air, which, it is claimed by some, promotes circulation in the boiler and is thus beneficial. Further than this, we do not believe there is any benefit, but on the contrary a loss.

(3) C. G. C., Aurora, Ill., writes: I am studying up the mechanical equivalent of heat as applied to steam, and am stuck on a question which arose in my mind as to whether the weight increases with the pressure or not. If it does increase with the pressure, will you tell me in what proportion it does so? *A.* You will find in any work on steam engineering tables of the properties of steam, from which you can find the weight of a cubic foot at any pressure.

(4) R. S., Enterprise, Miss., asks: 1. Please name the best paint for steam pipes and how to apply it? *A.* We know of nothing better than a paint made from asphaltum and turpentine, by mixing over a gentle fire as long as the turpentine will take up the asphaltum. It should be applied to the pipes when they are a little warm. 2. Do you know of a good reliable oil cup for a crank pin; one that can be depended upon all the time? *A.* We think they are like most other human devices, not perfect. You can keep trying until you find one that best suits you.

(5) H. S. Kokomo, Ind., asks: 1. Will you please tell me how the iron in the ordinary farm bells is made so hard; also the process by which they are made? *A.* Farm bells are now largely made of steel. When made of iron, the quality of the iron used governs the hardness of the bells. Small bells, such as you refer to, are made from a pattern the same as ordinary castings. 2. Is there any patent on the saw-grinding machine described by you in your issue of Aug. 13? *A.* Write to the manufacturer for information.

(6) T. R., Boston, Mass., writes: I wish your opinion on the following: With a screw-driver 6″ long, I fail to drive a certain screw home, while with one exactly similar, except that it is 12″ long, I can do so very easily. Now take two shafts, the one 12 feet long, and the other 6 feet long, of the same diameter, and working in the same bearings, does it take more to revolve the first than the second? If so is it not logical to suppose, the longer a screw-driver, the more power required to turn it, and therefore the more difficulty in driving a screw home? Practice teaches the reverse. How is it? *A.* If you will confine the screw-drivers as the shafts are confined, in boxes, you will find there is no advantage in the long one. In using a screw-driver, when the screw goes hard, you all unconsciously, perhaps, acquire the practice of inclining its axis to that of the screw as much as possible, and have the end hold in the screw slot. In this way you make a lever of the screw-driver, and the longer it is the more powerful the lever.

(7) E. C. W., Little Rock, Ark., writes: I am running a pump with steam cylinder, 30″ x 24″, and water cylinder 14″x24″. The boiler is 44″ diameter, and 21 feet long, with 12 6″ flues. I carry 75 lbs. steam. I am running at present high pressure (non-condensing), but there is a jet condenser attached. The fall from condenser pipe to hot well is 32½ feet. I want to ask: 1. By lowering the pumps 15″ and lengthening the exhaust pipe the same amount, leaving the hot well in the same place, will it make any difference? *A.* If, as we infer, you have a siphon condenser, you should not decrease the distance between the cylinder and the hot well. 2. The suction pipe of steam pump is 12″ in diameter and 1,000 feet long, and connects to 6, 4″ pipes driven 34 feet in sand. The discharge pipe is 12″ in diameter, and 145 feet high. How much water will the pump deliver, running 60 strokes per minute? *A.* The area of pump piston, deducting for piston rod, may be taken at 150″, and the length of a double stroke is 48″; hence the displacement of pump per stroke is 150×48=7200 cubic inches. The number of strokes per hour is 60×60=3600; hence the displacement per hour is 7200 × 3600 = 25920000. The loss from all causes would average about twenty per cent.; hence 25920000—5184000=20736000, which is the number of cubic inches of water delivered by the pump per hour. There are 231 cubic inches in a gallon; hence $\frac{20736000}{231}$=89766 gallons of water pumped per hour.

3. What horse power will it require? *A.* The horse power may be taken to be the resistance against the pump piston, assuming it to be constant, as due to the height the water is elevated (which is 145+18 =163 feet.) That is, any lack of pressure resulting from the diminished supply, as compared with the displacement of the pump, will be made up by friction in pipes and passages. The weight of a column of water 1″ square and 1 foot high, is .433 lbs., and the speed of piston is 240 feet per minute; hence $\frac{150\times163\times.433\times240}{33000}$=76 horse power. 4. The supply pipe to condenser is 3″, and the discharge pipe is 3½″. How much water will be required to condense the steam? *A.* Assuming that the feed water will amount to 35 lbs. per horse power per hour, you should provide for 30 times as much water for the condenser, which would be 76×35×30=79800, which divided by 8.3, the number of pounds of water in a gallon, gives $\frac{79800}{8.3}$=9614, or, say, 10000 gallons per hour. 5. How much difference will there be in fuel burned when running condensing or non-condensing? *A.* About 20 per cent.; but since you will have to pump the water for condensation, and since taking it will decrease the quantity by that much, and also since it would seem that you must use a separate boiler for your small pump, the absolute economy of running condensing would be very slight, if it was anything. 6. I have a steam pump for supplying the condenser, with steam cylinder 6″×12″, and water cylinder 8″×12″, boiler pressure 110 lbs. Can I take water for condenser from the discharge pipe of main pump? *A.* Yes. 7. Will a 1½″ pipe with 100 feet height of water-supply answer? *A.* We do not quite understand your question. If you mean to ask if you can pump water to a height of 100 feet, with the pump just described, we should say no; or, at least, not satisfactorily. If you mean to ask if a 1½″ pipe is large enough for water to flow through under 100 feet head to supply the condenser, our advice would be to make your pipe the full size of supply pipe mentioned, viz., 3″, and regulate by any kind of valve or gate. 8. The grate surface is 4 feet by 5 feet. How much oak wood should I burn? *A.* About 1⅛ cords per day of ten hours.

BUSINESS SPECIALS.

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Presses & Dies. Ferracute Mach. Co., Bridgeton, N.J.

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James W. See, Consulting Engineer, Hamilton, O.

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MANUFACTURES.

Geo. W. Davis and S. A. Davis have begun the manufacture of stationary engines and machinists' tools at Nashua, N. H.

The Hoyt M'f'g Co., Aurora, Ill., manufacturers of woodworking machinery, are putting up an addition, 62×152 feet to their works.

C. H. Brown & Co., of Fitchburg, Mass., will supply one of the three engines which are to furnish the power at the Atlanta Exposition.

Engineer-in-Chief Shock has ordered for the U. S. steamer Despatch, one of Schutte & Goehring's steam jet ventilators, through A. Aller, the New York agent.

Sackville, New Brunswick, wants a woolen mill. It has plenty of available capital, stock and labor, but it wants an active promoter, and one acquainted with the business.

Homer Hamilton, Youngstown, O., is building a rolling mill engine 34″x60″ for the Illinois Zinc Co. The fly wheel weighs 50 tons and the bed plate (40 ft. long) 20 tons.

The Cambria Iron Co., of Johnstown, Pa., has adopted a neat device for lessening the heat about the rolls and heating furnaces in the new rail mill. Two 40-inch pipes conduct a current of air from a large blower outside the building and discharge it down upon the workmen in the mill. This plan works admirably, and is highly appreciated by the employes.

E. Gould & Eberhardt, Newark, N. J., machine tool manufacturers, gave their employes and families an excursion by rail and steamer to Newburg on Saturday, August 20th which was highly enjoyed by all parties. This whole-souled firm are in the habit of doing this sort of thing, and find its cost well repaid by increased efficiency and interest in their work, on the part of their men.

The engineer of the Edison Electric Light Co., New York, has accompanied a recent order for a pair of Tabor indicators with the following letter: Ashcroft Mfg. Co., 111 Liberty St., New York; Gentlemen: I was much pleased with the last indicators which you made for this company. They are especially adapted to high speeds. Enclosed is an order for two more of the same pattern. Please deliver as soon as possible. Yours truly, Chas. L. Clarke.

E. W. Bliss, Brooklyn, N. Y. is working 300 men on dies, presses, and sheet metal machinery. He is also building twelve 20″ lathes for his own use. These lathes are especially heavy and substantial, with extra large spindles and long bearings, to adapt them to be used for turning work in the chuck. In a recent visit to the works there was seen, nearly completed, a three ton press for heavy copper work, which was contracted to be delivered in seven days from date of order, although at the time of taking the order there was not a piece of the castings or forgings on hand.

The Tanite Company of Stroudsburg, Pa., whom we recently noticed as having enlarged their works, are busy with orders from home and abroad for their emery wheels and grinding machines. They have just received the medal awarded them by the Sydney International Exhibition of New South Wales, Australia. The fact that this company, situated as they are in a locality where there is but little use for their emery wheels and grinding machinery, should receive honor and commendation from abroad and should quietly have pushed forward a business that, while little was known of it by the citizens, had made the name of their little borough of Stroudsburg, familiar in foreign lands, is commented upon by a local paper, with pardonable local pride.

Bliven, Barrows & Co. of 116 Wall Street, have completed arrangements to build for Dr. P. J. McCourt of 233 W. 23d St., N.Y, a fast steam yacht, which is expected to surpass anything heretofore built of like dimensions, in speed, elegance and convenience. She is to be 105x16x7; flush deck, full rigged and propelled by very high pressure steam, 250 lbs. To utilize this great pressure a special compound condensing engine has been designed by J. A. Reed of 50 Cliff St., New York, having cylinders 8″ and 20″x12″, so arranged as to be perfectly balanced in every particular and to make 300 revolutions per minute, developing 300 to 450 H. P. as required. Steam will be furnished by a Ward Water-tube Coil Boiler, as illustrated in our last issue, capable of sustaining 300 lbs. steam and a test of over 500 lbs.

Newly Incorporated Companies.

MASSACHUSETTS.

Hyde Manufacturing Company, Southbridge; Isaac P. Hyde, President; F. L. Chapin, Treas.; Capital, $12,000. For manufacturing knives, shoe tools, and other mechanical business.

Schenck Continuous Excavator Company, Boston; John H. Schenck, Prest.; Isaac Pitman, Treas.; Capital, $100,000. For the constructing, operating and licensing of machines, under patent numbered 22,893, of the United States, for the territory of the New England States, so called, and for other purposes germane thereto.

Standard Twine Cutter Company, Boston; Jott Grant, Prest.; Josiah W. Hubbard, Treas.; Capital, $50,000. For the manufacture and sale of cutters for cutting twine, willow, hemp, flowers, the pruning of trees, shrubs and vines, the cutting of wire and other things.

Standard Rubber Co., Boston; James S. Cumston, Prest.; William H. Hill, Jr., Treas.; Capital, $100,000. For the manufacture of India rubber goods.

The New York Construction Company, Boston; Charles Burleigh, Pres., A. W. Boardman, Treas.; Capital, $12,000. To make surveys, plans and estimates of cost of the whole or any part of a railroad between New York and Boston in the States of Massachusetts, Connecticut and New York, and Rhode Island, if desirable or necessary, or of any railroad elsewhere; and to make any contract or contracts for, and performing the labor in and furnishing the materials for the construction and equipment of the whole or any part thereof, with authority to subscribe for, take hold and own bonds, stock and other securities in such railroad.

Fisher Manufacturing Company, Grafton; George W. Fisher, Pres., Francis Cabot, Treas.; Capital, $300,000. The manufacture of cotton and woolen fabrics.

PENNSYLVANIA.

The Elkins Manufacturing and Gas Company, Philadelphia; Wm. G. Warden, 317 South 11th St., Wm. L. Elkins, 1218 North Broad St., Martin Maloney, 2107 Park Ave., Phila., Pa., corporators. Capital, $250,000. Manufacturing Gas Machines and building Gas Works.

Pittsburgh and South Avenue Bridge Company, Pittsburgh; office No. 64 Fourth Ave.; Hon. Henry M. Long, L. Halsey Williams, George I. Whitney corporators. Capital, $200,000.

Alden Coal Company, Wilkes-Barre; Richard Sharpe, Wilkes-Barre, Francis Weiss, Bethlehem, Pa., M. S. Kemmerer, Mauch Chunk, Pa., corporators. Capital, $250,000.

Red Ash Coal Company, Wilkes-Barre; George H. Parrish, Frederick Parrish, Morgan B. Williams, corporators. Capital, $400,000.

The Scranton Steel Company, Scranton; W. W. Scranton, Walter Scranton, William Connell, and others, incorporators; Capital, $600,000. To manufacture iron and steel.

The South West Coal and Coke Company; office, Mount Pleasant, Westmoreland Co., Pa.; H. C. Frick, Pittsburgh; Wm. J. Hitchman, Mount Pleasant; Walter Ferguson, Pittsburgh, and others, incorporators; Capital, $400,000. To mine coal and manufacture iron, steel and coke.

The Friedensville Zinc Company, Friedensville, Lehigh Co., Pa.; F. Osgood, Staten Island, N.Y.; W. H. Osgood, New York; R. E. Wright, Jr., and others, incorporators; Capital, $100,000. To mine zinc, ore and blende.

The Westmoreland and Fayette Railroad Co.; office, Pittsburgh; G. T. Rafferty, Geo. A. Cook, T. H. Fahnestock, and others, incorporators; Capital, $100,000. To construct a railroad from Connellsville, Pa., to Mount Pleasant, Pa., a distance of 10 miles.

Dawson, Broadford and Mount Pleasant Railroad Co.; office, Pittsburgh; G. T. Rafferty, Geo. A. Cook, T. H. Fahnestock, and others, incorporators; Capital, $200,000. From Dawson, Fayette Co., Pa., to Mount Pleasant, Westmoreland Co., a distance of 12 miles.

The Central District and Printing Telegraph Co.; office, Pittsburgh; Ralph Bageley, Capt. Madison Bailey, Daniel Colestock, and others, incorporators; Capital, $500,000.

The Germantown, Norristown and Phœnixville Railroad Co.; office, Philadelphia; A. J. Cassatt, Geo. B. Roberts and J. N. Dubarry, and others, incorporators; Capital, $1,500,000. To construct a railroad from a point near Ridge Ave. and Thirteenth St., Phila., to Phœnixville, a distance of about 27 miles.

The Allegheny and Susquehanna Railroad Company; office, Pittsburgh; Walston H. Brown, James Callery and W. C. Mobly, incorporators; Capital, $500,000. To construct a railroad from a point on the Allegheny River, opposite Red Bank, to Brookville, a distance of about 50 miles.

Pittsburgh Junction Railroad Company; office, Pittsburgh; E. K. Hyndman, Connellsville, Pa.; James Callery, Allegheny, Pa.; Walston H. Brown, No. 11 Pine St., New York, and others, incorporators; Capital, $360,000. To construct a railroad across the City of Pittsburgh, from the Allegheny to the Monongahela Rivers, a distance of 6 miles.

The Pittsburgh, McKeesport and Youghiogheny Railroad Co.; office, Pittsburgh; W. C. Quincy, Jas. I. Bennett, David Hostetter, and others, incorporators; Capital, $500,000. To construct a railroad from Pittsburgh to New Haven, Fayette Co., a distance of 50 miles.

CONNECTICUT.

The Old Globe Copper Co., Waterbury; Geo. H. Sisson, Globe, Arizona; D. B. Hamilton, Waterbury, Ct., and others, incorporators; Capital, $300,000. To own and work mines for gold, silver, copper, and other metals.

The National Mfg. Co., New Haven; Geo. A. Butler, Harold H. C. Johnson, and others, incorporators; Capital, $10,000. To manufacture and deal in machinery and tools.

Yale Mfg. Co., New Haven; S. C. Johnson, W. P. Plant, and others, incorporators; Capital, $20,000. To manufacture and deal in machinery and tools.

NEW JERSEY.

The Railway Syndicate Company, Jersey City; Robert B. Floyd-Jones, David R. Hobby and Arthur W. H. Labiaux, incorporators; Capital, $300,000. To construct and equip railroads of every description in the State of Pennsylvania and other states.

Economy Manufacturing Company, Camden; Joseph Abbott, Scott A. Mackenzie and E. V. Machette, incorporators; Capital, $500,000. To develop a certain patent for a chemical compound for scouring wool and treating cotton goods, etc.

United States Fish Freezing Company, Camden; William M. Singerly, Adam Warthman, James Stewart, Jr., and others, incorporators; Capital, $1,000,000. To carry on the business of buying, and selling and keeping in preservation for sale, etc., all kinds of fresh fish, and to license others to carry on the said business under letters patent.

Florida Southern Construction Company, Jersey City; John O. Stevens, Myron Hume and James D. Shannon, incorporators; Capital, $100,000. To build vessels, wharves, docks, piers, railroads, etc., for railway companies, and especially to build the railroad from Enterprise to Titusville, in the State of Florida.

Atlantic and Pacific Electric Manufacturing Company, Camden, N. J. and Philadelphia, Pa.; M. Schoenfield, Rudolph M. Hunter, Jacob Loch and others, corporators; Capital, $100,000. The manufacture and sale of dynamo-electric lamp posts, underground conductors, scientific and mechanical instruments and machinery, and the furnishing of electric lights to factories, towns, cities, &c.

Shrewsbury Water Company, Red Bank; J. H. Peters, John S. Applegate, Anthony Reckless and others, corporators; Capital, $100,000. To erect, construct, maintain and operate water-works in the village of Red Bank, Monmouth Co.

Machinists' and Engineers' Supplies.

NEW YORK, August 25, 1881.

Business in the supply market continues in a healthy condition. Sales are necessarily fewer and smaller than they would be were not most of the manufacturers oversold. Prices remain unchanged since our last report, with tendency slightly upward.

Drop forgings are very hard to obtain, likewise some styles of stocks and dies.

At a recent meeting of the manufacturers of machine bolts, nuts, washers, etc., prices were adopted as follows: Machine bolts, bolt ends, lag screws and skein screws, discount from list 60 per cent.; square and hexagon nuts, 7½ cents, plate washers, 7 cents, lag screws, 60¾ cents off list.

The demand for nails is more active this week, and the market firm. We quote 10d to 60d $3.05 and $3.15, net, according to quantity.

Wrought iron pipe remains unchanged since our last report, but may slightly advance.

W. E. Duyckinck, 50 and 52 John St., New York City, has adopted a system of furnishing discount sheets by the classification of the different articles sold in the supply business, as follows:

CLASSIFICATION OF SUPPLIES.

Class I.—Indicators and regulators, gauges, governors, etc.
II.—Pumps, hose, fire department goods.
III.—Pipe and fittings.
IV.—Lamps and lanterns.
V.—Pipe tools
VI.—Plumbers' tools.
VII.—Machine shop tools.
VIII.—Blacksmiths' tools.
IX.—Moulders' tools.
X.—Boiler makers' tools.
XI.—Railroad contractors' tools.
XII.—Belting and tools.
XIII.—Machinists' fine tools.
XIV.—Bolts, nuts, screws, etc.
XV.—Car fittings, etc.

In sending for quotations the customer names the kind of goods required, together with the number attached, and receives in return a discount sheet of that particular class of goods. By this system the quotations are rendered more complete in detail, and avoids the necessity of sending a complete list of discounts.

The Pratt & Whitney Co., Hartford, Conn., have just issued a new illustrated catalogue, supplemented by a price list. The new catalogue consists of 156 pages, instead of 143, comprising last year's catalogue. It contains a number of illustrations of new tools and machines, with description and prices of the same, together with other specialties manufactured by this concern.

Iron and Metal Review.

During the past week the sales of American pig iron have been moderate, although the inquiries are said to have been numerous. We quote same as last week: Foundry No. 1, $24.50 to $25; No. 2 X Foundry, $22 to $22.50. Grey Forge, $21. Scotch Pig, market moderate yet firm. Eglinton, $21; Cambroe, $22.50; Coltness at $23.50 to $24, Gartsherrie, $23 to $23.50, and Glengarnock, $22.50 to $23. Iron and steel rails—Sales moderate, with an active inquiry. Iron firm at $48 to $49; steel rails quoted $55 to $65, according to delivery. No. 1 wrought scrap, $28 to $30. Ingot Copper has slightly fallen, with small sales, but the market is firm, being 16¼c. to 16¾c. Pig tin still firm. We quote Straits, 21¼c.; Australian 21¼c.; Billiton, 21c. Lead is firm, Common, 4⅞c. to 5c.; Refined, 5⅛c. to 5¼c. Spelter slightly lower and transactions light; Western, 5 1-16c.; Silesian remains inactive. Sheet Zinc, 7c. Antimony, 14¾c. to 15c.

WANTED

Tool Maker Wanted, must be well recommended and capable of making first-class tools, address with references and price, B., BOX 15, AMERICAN MACHINIST.

Position as Superintendent by a well-known and experienced Machinist and Designer, who is now occupying a similar position. Address, SUPERINTENDENT, AMERICAN MACHINIST Office, Box 14.

A Mechanical Engineer, of considerable practical experience, graduate of a technical institute, is desirous of engagement in a position of responsibility in some good manufacturing concern. Best references. Address, F., P. O. Box 875, New York.

A practical man, of twenty years experience as Pattern and Model Maker, and at experimental work, will be at liberty about the first of September; would like to begin with a new firm and progress with it, or would go on the road to help introduce a meritorious article. Good references given. Address, "Muxor," care Lock Box 221, Springfield, Ohio.

BLACKIE'S DRAWING BOOK.

A complete course of instruction for the practical engineer, comprising Linear Drawing, Projection, Eccentric Curves, Gearing, Sketching from Machines, Projection of Shadows, Tinting and Coloring. Illustrated by seventy-one plates. Complete in 16 parts, $12.00, or strongly bound in half-morocco, $17.00. Sent free by mail or express on receipt of price.

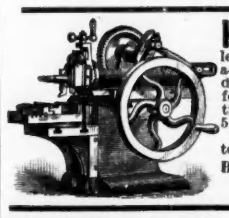
E. & F. N. SPON, 446 Broome St., N. Y.

F. E. REED,
Successor to A. F. PRENTICE & CO.
Manufacturer of
Light Machinists' Tools,
54 Hermon St., Worcester, Mass
Send for Illustrated Catalogue.

NEW ENGLAND MANUFACTURERS' GREAT FAIR,
To Open August 18, 1881.

APPLICANTS FOR SPACE
are respectfully requestd to reduce as much as possible the amount applied for in order that Exhibitors who have not specified their requirements may not have their applications for space rejected.

R. C. GRAVES, Agent,
Office, 5 Pemberton Square, Boston, Mass.

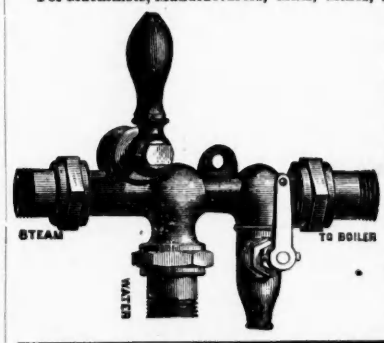


HAND & POWER SHAPING MACHINES. Full length of stroke 6 in. May be adjusted to any less distance desired. Automatic cross feed, with 6 in. traverse. Vertical adjustment of table, 5 inches.
For full particulars apply to
BOYNTON & PLUMMER,
Worcester, Mass.

PARKER & CO., Machinists
17 & 19 Mechanic St., Newark, N. J.
Accustomed to Gun Work, Model Guns built, Tools and Dies. Light Work a Specialty.

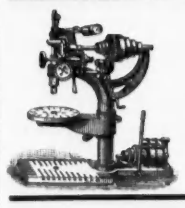
D. H. TUTTLE, 21 BEEKMAN ST NEW YORK — Engraver on Wood — MECHANICAL WORK A SPECIALTY

COOKE & CO., (Formerly Cooke & Beggs),
6 Cortlandt St., New York.
Agents for
The Keystone Injector.
(The Simplest Known Boiler Feeder,)
And Dealers in
MACHINERY AND SUPPLIES
Of every description,
For Machinists, Manufacturers, Mills, Mines, Etc



Send for Price List, and state that you saw this advertisement in this Paper

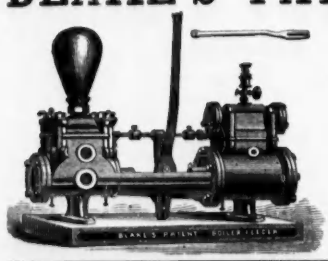
PHŒNIX HARDENING COMPOUND
For the Use of
Machinists, Tool Makers, Die Sinkers, Gunsmiths, Blacksmiths, Carriage and Wagon Makers,
And all others making and using Steel Tools.
PHŒNIX MANUFACTURING COMPANY,
107 High Street, Newark, N. J.
Samples sent free by mail. Put up in Quart and Gallon Cans. Price $1 per Quart; $3.50 per Gallon



GEO. C. HOWARD,
1751 Barker St, Philadelphia.
Manufacturer of
LATHES, PLANERS
DRILL PRESSES, &c.
And other Machine Tools for R. R. and Machine Shops.

FOR SALE.
One 40, 60 & 75 H. P. Second-Hand
STATIONARY ENGINE.
Also a great variety of small
STEAM ENGINE BOILERS & TOOLS.
S. L. HOLT & CO.
67 Sudbury St., Boston, Mass.

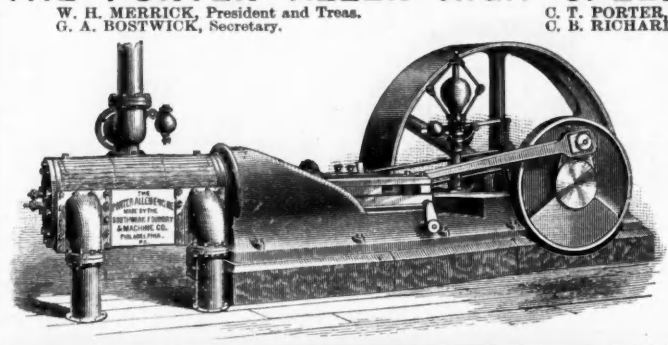
BLAKE'S PATENT STEAM PUMPS.



MORE THAN 13,000 IN USE.
Adapted to Every Situation.
Send for New Illustrated Catalogue.
GEO. F. BLAKE MANF'G CO.
88 Liberty Street, NEW YORK. | 44 Washington St., BOSTON.

FRICTION CLUTCH PULLEYS AND CUT-OFF COUPLINGS,
JAS. HUNTER & SON, North Adams, Mass.

THE PORTER-ALLEN HIGH SPEED ENGINE.
W. H. MERRICK, President and Treas. C. T. PORTER, Vice-President.
G. A. BOSTWICK, Secretary. C. B. RICHARDS, Superintendent.



THE SOUTHWARK FOUNDRY & MACHINE CO., Philada., having largely increased its facilities is now prepared to fill all orders for the Porter-Allen Engine on contract time.
Orders solicited for Iron and Brass Castings in the rough.
Address the Company, 430 Washington Avenue, Phila., Pa.

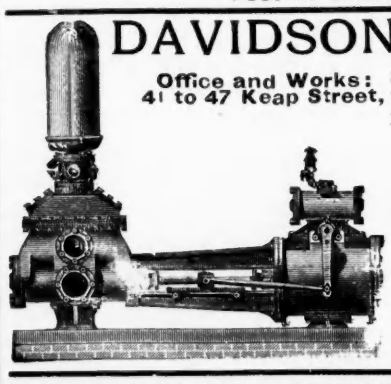
KEARNEY & FOOT
Office, 101 Chambers Street, N. Y. | **Full Weight Hand-Cut Files.** | Manufactory, PATERSON, N. J.
The best and cheapest in the end. Send for quotations. The files speak for themselves in the following testimonials. Read them.

THE SINGER MANUFACTURING CO.
Messrs. KEARNEY & FOOT, Elizabethport, N. J., July 9th, 1877.
Dear Sirs:—We have for the past ten years used the Files of your manufacture, and during that time we have never had any fault to find with them. We can safely affirm that for evenness of temper, sharpness of cut, accuracy of shape and all other qualities which go to make up a perfect File, they are equal, and in some respects superior, to the best English-made Files. Very Truly, WM. H. INSLEE, Contractor.
Messrs. KEARNEY & FOOT, Elizabethport, N. J., May 3rd, 1877.
Gentlemen:—We have been using your Files, both new and re-cut, for several years, and take pleasure in saying that we have found them a very superior article.
HANS REISE, Contractor, with The Singer M'f'g Co.

We print on card board 10 x 12 in. "Instructions on the use of Files," which are intended for shop use. These instructions with our "Illustrated Catalogue of Files" we mail on receipt of 27 cents postage To customers we mail a complete set free of charge. KEARNEY & FOOT.

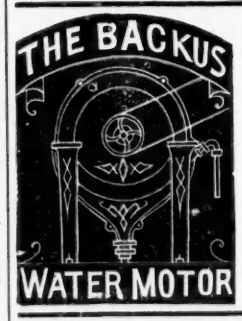
A. S. CAMERON'S
PATENT STEAM PUMP
IS THE Standard of Excellence At Home and Abroad.
THE A. S. CAMERON STEAM PUMP WORKS,
Foot of East 23d Street, New York.

DAVIDSON STEAM PUMP CO.
Office and Works: 41 to 47 Keap Street, BROOKLYN, N. Y.
MANUFACTURERS OF
THE M. T. DAVIDSON
Improved Steam Pump.



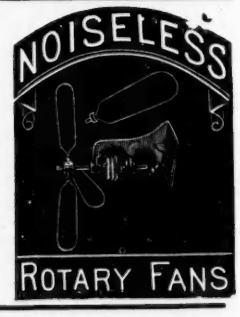
Warranted the Best Pump Made for all Situations.
KELLY & LUDWIG, Agents, 49 & 51 North 7th St., Phila. 6 Cortlandt St., New York.

LEHIGH VALLEY EMERY WHEEL CO.
LEHIGHTON, PA.
Manufacturers of Emery and Corundum Wheels and Grinding Machinery.
COOKE & CO., 6 CORTLANDT ST., NEW YORK AGENTS.



Supplies from Hydrant pressure the cheapest power known for blowing Church Organs, running Printing Presses, *Sewing Machines*, Turning Lathes, Saws, Grindstones, Coffee Mills, Sausage Machines, *Electric Lights*, Elevators, etc. Needs little room, no firing up, fuel, ashes, repairs, engineer, explosion, delay, extra insurance or coal bills. Is noiseless, neat, compact, steady; will work at any pressure of water above 15 lbs. Prices from $15 to $300.

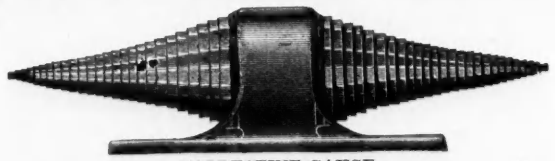
These fans can be fastened to ceiling or side wall, and driven by a round belt direct from a Backus Water Motor, Steam Engine or other power. Blades can be covered with paper muslin to suit the taste in color. By changing angle of Blade amount of air can be regulated. Two or more fans can be connected on ceiling. Shaft of fan runs in metaline journals, and requires no oiling, a consideration where put up in dining rooms over tables. Price, $5 each



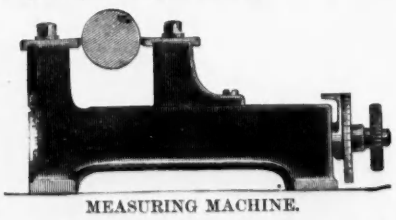
THE BACKUS WATER MOTOR CO., Newark, N. J., or 323 Broadway, New York.

BETTS MACHINE CO., WILMINGTON, DEL.
MANUFACTURERS OF
STANDARD GAUGES,
MEASURING MACHINES & ADJUSTABLE REAMERS.

STANDARD GAUGE.
Any size from ¼ in to 6 in.



CORRECTIVE GAUGE.
The disks are ground separately. Any combination of sizes can be made.



MEASURING MACHINE.
Sizes, 0 to 4 in., 0 to 12 in., 0 to 24 in. Can indicate to 1/10000 of an inch.

ADJUSTABLE REAMER.
Any size from ½ in. to 2½ in.
Size Maintained by Blade Adjustment.
Will Outlast the Solid Reamer.
Shank Ground to Standard Size.

KEEP SIZES RIGHT and thus CHEAPEN PRODUCTION.
SEND FOR CIRCULAR.